federal register

WEDNESDAY, OCTOBER 22, 1975

PART III:

ENVIRONMENTAL PROTECTION AGENCY

NEW MOTOR VEHICLES AND NEW MOTOR VEHICLE ENGINES

■

Control of Air Pollution

ENVIRONMENTAL PROTECTION AGENCY

[40 CFR Part 85]

[FRL 437-7]

CONTROL OF AIR POLLUTION FROM NEW MOTOR VEHICLES AND NEW MOTOR VEHICLE ENGINES

Emission Regulations for New Motorcycles

Notice is hereby given that the Environmental Protection Agency is considering the addition of a new Subpart E to Part 85 of Title 40 of the Code of Federal Regulations.

On Thursday, January 17, 1974 the EPA published in the FEDERAL REGISTER an advance notice of proposed rule making (ANPRM) which outlined the Agency's intention to establish emission regulations for new motorcycles. The ANPRM was the result of the EPA's recognition of the significant impact of motorcycles on urban air quality, the projected increase of this impact in the future, and the comparison of motorcycles with other vehicles serving a similar transportation function which meet emission control requirements.

Exhaust and crankcase emission standards were proposed in the ANPRM at the following levels for the 1976 through 1978 model years: 5.0 grams per kilometer (g/km) for hydrocarbons, 17 g/km for carbon monoxide, and 1.2 g/km for oxides of nitrogen. The ANPRM also proposed a crankcase emission standard beginning with the 1976 model year. Motorcycle standards for 1979 and beyond were proposed at the same levels as the statutory emission standards for light duty vehicles. The ANPRM further indicated that the procedures for motorcycle emission testing would evolve from current light duty vehicle regulations.

Comments were solicited in the ANPRM on specific technical areas to aid the EPA in the preparation of the emission regulations. Motorcycle manufacturers, industry organizations and suppliers, emission testing organizations, and citizen groups responded extensively with data and other material to the EPA. The analysis of these comments and EPA experimental work have formed the basis of these proposed regulations.

With this notice of proposed rule making (NPRM), the EPA proposes the motorcycle emission regulations more definitively while seeking additional comments.

Emission Standards—Comments to the ANPRM were in very close agreement on the carbon monoxide and nitrogen oxides emission standards during the initial regulatory period. It was the general consensus of the commenters that standards of 17 grams per kilometer of carbon monoxide and 1.2 grams per kilometer of nitrogen oxides could be met in the near term by both two and four-stroke motorcycles regardless of engine size. However, no such agreement existed on the hydrocarbon interim standard. The EPA analyzed many different approaches before deciding upon the one which would obtain the maximum hydrocarbon reduction possible in the short term and allow an orderly development of emission control technology for the long term.

The EPA is proposing a displacement dependent hydrocarbon phase-in standard with emission levels proportional to engine displacement. The standard begins at 5.0 grams per kilometer for motorcycles of 170 cc engine displacement and less, and rises linearly with displacement to 14 grams per kilometer for 750 cc motorcycles. The standard then remains constant at 14 grams per kilometer for motorcycles over 750 cc displacement. This displacement dependent standard is applicable to two and four-stroke cycle reciprocating engines as well as all rotary engines.

The 1980 and subsequent model year standards proposed in this notice are 0.25 grams per kilometer (g/km) for hydrocarbons, 2.1 g/km for carbon monoxide and 0.25 g/km for oxides of nitrogen. (The grams per mile equivalents are 0.41, 3.4 and 0.4 respectively.) This is not intended to imply an agency determination that these levels of control are cost effective, technologically feasible or fully in the public interest. Rather, these levels are being proposed because they are equivalent to the light duty vehicle standards for 1980 and subsequent model years as currently set forth in the Clean Air Act, and on the premise that all vehicles used for public transportation should, to the extent feasible, be controlled to the same levels of allowable emissions of air pollutants. However, the levels of motorcycle standards ultimately to be promulgated for 1980 will be dependent upon the technical feasibility of attaining control to automobile emission levels, the cost-effectiveness of control to such levels, and the outcome of current Congressional reconsideration affecting future year emission standards for automobiles. Thus, it is intended that the ultimate levels of motorcycle control be equivalent to light duty control, unless data developed during and as a result of this proceeding indicate that such control is not feasible due to technological or cost restraints.

It is important to note that the displacement dependent hydrocarbon phase-in standard is considered a temporary compromise necessary for short term emission reductions while allowing long term control technology development and that the long term standards will not be based upon engine displacement.

The EPA is proposing a crankcase emission standard with certification based on engineering analysis rather than system testing. All motorcycle manufacturers of four-stroke cycle engines who responded to the ANPRM were in agreement with this standard; their major concern was with its implementation date. Those manufacturers who commented on the ANPRM agreed that the standard could be met by 1978. As discussed below, the EPA is proposing to implement this standard concurrently with the phase-in emission standards in 1978.

Implementation Dates—The implementation dates for these two sets of standards have been changed from those in the ANPRM. The new dates are January 1, 1978 for the phase-in and crankcase emission standards and January 1, 1980 for the long term standards. The change is due to lead time considerations for the implementation of control technology by the manufacturers and the regulatory process by the EPA. In addition, the terminology for implementation has been changed from "model year" to "year of production". Many manufacturers requested such a change to more accurately represent the typical motorcycle manufacturing process. Thus, these standards apply only to those new motorcycles produced on or after January 1, 1978 or 1980, as appropriate, independent of the manufacturer's model year designation.

Applicability—The proposed emission regulations are applicable to those new motorcycles manufactured for street or highway use except those with engine displacements less than 50 cc. Under the Clean Air Act, the EPA does not have the authority to prescribe standards for vehicles not designed for use on streets or highways.

As requested by some manufacturers, consideration has been given to raising the displacement exception for the phase-in standards to 100 cc or 170 cc. However, since uncontrolled two-stroke motorcycles with engine displacements between 50 cc and 170 cc emit hydrocarbon emissions above 5.0 grams per kilometer, significant emission reductions will result if these motorcycles meet a standard of 5.0 grams per kilometer. Therefore, the displacement exception to these standards remains at less than 50 cc.

Dynamometer Driving Schedules—Practically all motorcycle manufacturers who responded to the ANPRM consider the EPA urban dynamometer driving schedule satisfactory for large displacement motorcycles (engine displacements equal to or greater than 170 cc). However, the dynamometer driving schedule for small displacement motorcycles continues to be an area of concern to both the EPA and the manufacturers. Since the comments to the ANPRM did not provide substantial data which would allow development of a new driving schedule for small displacement motorcycles, the EPA is proposing a modified urban dynamometer driving schedule for motorcycles with engine displacements less than 170 cc. This modified schedule scales down the velocities of the high speed portion of the EPA urban dynamometer driving schedule (from second 164 to second 332) by the factor 0.64.

Dynamometer Driving Distance—The proposed procedure for calculating motorcycle weighted emissions is a modified form of the light duty method. The proposed procedure uses the actual test driving distance, as measured by a dynamometer roll revolution counter, for calculating the grams per kilometer emissions. During EPA testing of motorcycles capable of following the driving schedule, variations in the measured driving distance of up to 3 percent of the standard distance have been observed. The new procedure, which accounts for dis-

tance variations, will reduce variability in the calculated emissions. For motorcycles not capable of following the driving schedule, the proposed procedure will also result in more representative calculated emissions.

Chassis Dynamometers for Distance Accumulation—The EPA recognizes the need of some motorcycle manufacturers to use chassis dynamometers for distance accumulation. The EPA will communicate any special test procedures or requirements in Advisory Circular format similar to the Advisory Circular issued for light duty vehicles. Such requirements will be intended to duplicate the conditons a motorcycle experiences when accumulating distance on a road or track. Specific detailed comments are solicited on the manner in which these requirements for motorcycles should differ from those in practice for light duty vehicles (reference: MSAPC Advisory Circular number 35), including the use of indoor dynamometers for distance accumulation.

Road Load Power Absorption—The equation for road load power absorption specified in this NPRM is based on EPA in-house experimental track testing using the coast down timing method. Additional work is planned by the EPA in this area to confirm or modify these numbers as appropriate.

Heated Flame Ionization Detector (HFID)—The ANPRM revealed that the EPA was considering the use of a heated flame ionization detector for measurement of hydrocarbon emissions. Based on the comments received to the ANPRM and further analysis of the HFID test method, the EPA is now proposing to use a "non-heated" flame ionization detector for hydrocarbon emission measurement. Further studies will be performed to determine if HFID measurements are required, and if necessary, appropriate procedures for motorcycles will be developed.

Oil Accumulation—EPA in-house testing has revealed the accumulation of oil on the walls of the tubing used to transport exhaust gases to the constant volume sampling system and in parts of the dilution air filter assembly. This potential problem also has been reported by other testing facilities. It is hypothesized that two-stroke engine oil is collecting in the sampling system during testing. Since the buildup of this oil could result in erroneous hydrocarbon emission measurements, comments are solicited on the causes and potential magnitude of this problem and methods, such as system cleaning or heating, of alleviating it.

Constant Volume Sampler—The EPA is planning to investigate the use of a critical flow venturi constant volume sampler (CFV–CVS) for motorcycle emission measurements instead of a positive displacement pump constant volume sampler (PDP–CVS) as is proposed in this notice. A diagram of the CFV–CVS is presented in Figure 1. It is intended that even if the CFV–CVS is adopted for use in EPA testing, its use by manufacturers will be an optional alternative to the PDP–CVS.

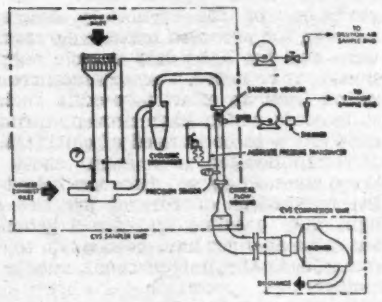


Figure 1

Critical Flow Venturi Constant Volume Sampler

Transmission Shift Points—Most manufacturers who responded to the ANPBM did not agree with basing manual transmission shift points on a percentage of engine RPM. Upon careful reconsideration, the EPA is proposing to base shift points on vehicle speed as is done currently for light duty vehicles. The values specified in this NPBM are based on EPA in-house testing. However, the EPA also is proposing to allow manufacturers the option of using their own recommended vehicle shift speeds for testing purposes.

Standard Rider Mass—Most manufacturers indicated that approximately 80 kilograms (176 pounds) should be used as a standard rider mass for testing purposes. The EPA is again proposing an 80 kilogram rider mass based on the results of the Gallup Motorcycle Survey as well as earlier demographic studies. The Gallup survey indicated that the average weight of a motorcycle owner is 164 pounds. When considering the addition of normal motorcycle riding apparel, the EPA considers an 80 kilogram rider mass appropriate for testing purposes.

Soak Time—The EPA has obtained overnight cool down temperature versus time data on a variety of motorcycles. As expected, the data indicate that a Harley-Davidson FL–1200 required the longest cool down time of any motorcycle tested by the EPA. This motorcycle required a minimum soak time of 10 to 11 hours for the engine temperature to be within 1° C of the ambient soaking temperature. In order that the soak time be sufficient to permit all types and sizes of motorcycles to cool to the ambient soaking temperature, the EPA is proposing that the light duty vehicle 12 hour soak requirement be extended to the motorcycle test procedure.

Certification Program—The proposed certification program involves emission testing of preproduction motorcycles in order to determine whether the designs of the engine-emission control systems are capable of meeting the standards. An approach similar to that used for evaluation of the design of light duty vehicles is being adopted for motorcycles. In this approach, test vehicles are selected to represent vehicles which are expected to have similar emission characteristics. A number of motorcycles (emission data vehicles) is tested after break-in at low mileage and a smaller number of motorcycles (durability data vehicles) is tested at a sequence of test points throughout a distance accumulation period equal to their useful life. The deterioration factors (degree of emission deterioration) determined for each of the latter vehicles are used to project the deterioration of emission control that can be expected over the useful life of emission data vehicles with similar design characteristics. Test results from emission data vehicles, adjusted by the applicable deterioration factors, are compared to the level of the standard to determine compliance.

The EPA has considered the possibility of reducing in certain instances the number of test vehicles otherwise required in the proposed regulations. The following was considered: (1) The cost of certifying an engine family (group of engines with similar emission characteristics) tends to be independent of the number of unit sales; thus the certification cost per vehicle produced obviously is higher if the volume of sales is small; because of that, the cost of certification impacts more heavily on manufacturers with low volume annual sales than it does on manufacturers with high volume annual sales. (2) The aggregate annual sales of all motorcycle manufacturers of less than 10,000 annual motorcycle sales represent only five percent of the total number of new motorcycles sold annually. Out of thirty-five motorcycle manufacturers known to EPA, there are only six with greater than 10,000 annual motorcycle sales. (3) The cost of testing and accumulating distance on durability vehicles represents the greater portion of the cost to manufacturers of certification.

Due to these considerations, EPA is proposing that, subject to prior approval by the Administrator, manufacturers with annual sales of less than 10,000 motorcycles may utilize deterioration factors specified by EPA rather than develop deterioration factors through the operation of durability vehicles and may also be granted a reduction in the number of emission data vehicles otherwise required by the regulations. Any adverse impact on the precision of the evaluation of the capability of the design to meet standards will be greatly mitigated by the relatively low impact on air quality of so small a fraction of all motorcycles.

EPA is also considering providing manufacturers of greater than 10,000 annual sales with the option of using deterioration factors specified by EPA for engine families projected to have low volume sales. To aid EPA in reaching a decision on this matter, interested manufacturers are requested to provide EPA with 1974 and 1975 sales data tabulated for motorcycles with the same number of cylinders, engine displacement, and engine type (i.e., two-stroke, four-stroke). Interested parties are requested to provide any data or comments bearing

on whether or not EPA should pursue such a course.

The EPA is also interested in any data and/or considerations the manufacturers may have regarding whether EPA should specify a single average deterioration factor applicable to all motorcycle engine families eligible for and using this option, specify separate deterioration factors for each engine family, or use some other approach. In addition, the EPA is interested in learning whatever information manufacturers would be able to provide concerning the durability aspects of their motorcycles, their components, and emission control hardware, in support of a request for use of deterioration factors specified by EPA in lieu of operating durability vehicles.

Useful Life—The useful life distance for motorcycle durability testing is defined as the average distance a motorcycle may be expected to travel in its lifetime. Based on the Gallup Motorcycle Survey results and registration data, the useful life distance has been calculated to be 30,000 kilometers for vehicles with engine displacements equal to or greater than 170 cc (10.4 cu. in.) and 12,000 kilometers for displacements less than 170 cc (10.4 cu. in.).

Maintenance—The intent of the maintenance schedule for certification vehicles is to duplicate average consumer practice. The only substantial data received by the EPA on consumer maintenance practices for motorcycles are from the survey performed by the Gallup Organization. The values for the frequency of scheduled maintenance on certification vehicles specified in this NPRM are based upon these data. Although the allowable maintenance specified in this NPRM does not permit maintenance or repairs which involve access to the combustion chamber (cylinder head decarbonization, valve repairs, etc.), the EPA is interested in exploring the in use frequency of such maintenance and repairs in greater detail. It is therefore requested that interested parties submit detailed information on the frequency of cylinder head decarbonization and on the probability that major engine repair will be required within the durability distance. Information on the effects of cylinder head decarbonization and major engine repairs on emissions is also solicited.

Engine Families—The comments to the ANPRM indicated that many of the test vehicle parameters used for determining light duty vehicle engine families were inappropriate for classifying motorcycles. The EPA agrees with this and is specifying test vehicle parameters which are intended to group motorcycles with similar emission characteristics into separate engine families. In addition, the selection of motorcycle durability and emission data vehicles has been changed slightly from the criteria used for light duty vehicles to more accurately represent motorcycle engine families.

The ANPRM indicated that the motorcycle emission regulations would be drafted as an evolution of the current light duty gasoline and diesel regulations. Upon careful examination, certain variations of the regulatory language between the proposed motorcycle regulations and the light duty vehicle regulations may be noted. These differences resulted from an effort to modify certain statements which have proven, through experience, to be in need of clarification or simplification. As such, most of these changes do not alter the intent of the regulations or current practice for light duty gasoline and diesel vehicles, but some changes have been made to accommodate the unique requirements of motorcycles.

An essential ingredient in the establishment of the motorcycle regulations is cost information. Data in the past have been minimal in this area; thus, the EPA is seeking detailed submittals from interested parties on the costs and savings associated with the motorcycle emission regulations. In order to expedite the analysis and review of this information, the EPA suggests that comments address the following points for each motorcycle model: (a) production year, (b) engine type and displacement, (c) proposed emission control system, and (d) exhaust emission level. Information addressing the following items is requested for each separate combination of (a) through (d) above. In addition, base line information for each model is requested for comparison purposes.

(1) *First Cost Estimates:*

(a) A separate description of each component of the control system such as modified carburetors, improved engine cooling details, new ignition system, PCV system, etc.

(b) The cost of each component or modification itemizing materials, labor, overhead, and general and administrative costs.

(c) Tooling amortization costs including the time period over which amortization is assumed.

(d) Total dealer margin costs and total profit.

(e) The pre-tax list price.

(f) The expected range of state and/or local taxes.

(g) The selling price.

(h) Base line—1975 total price averaged for the model.

(2) *Maintenance Cost Estimates:*

(a) A description of each separate maintenance item (PCV system, air pump, etc.) including all pre-emission control maintenance (spark plugs, ignition system, etc.).

(b) Customer cost of replacement parts impacted by emission controls specifying markup as well as dealer cost and markup.

(c) The required number of hours for maintenance of emission control systems, i.e.: number of man-hours in a "flat rate" manual.

(d) Customer labor cost including markup.

(e) The number of times maintenance is performed during the vehicle's lifetime.

(f) Base line—the above cost information for all 1975 recommended maintenance for the model, as indicated in the owner's manual.

(3) *Fuel Cost Estimates:*

(a) Urban and highway fuel economy data with an indication of the test procedures used.

(b) Base line—the same data for the 1975 model.

Interested persons may participate in the rule making proceeding by submitting written comments to the Deputy Assistant Administrator, Office of Mobile Source Air Pollution Control (AW-455), 401 M Street, S.W., Washington, D.C. 20460. It is requested but not required that 10 copies be submitted.

Single copies of the draft Environmental Impact Statement (EIS) for this regulation are available upon request from the Public Information Center (PM-215), U.S. Environmental Protection Agency, Washington, D.C. 20460.

Reflected in the draft EIS is an evaluation of the inflationary impact of the regulation which has been prepared in accordance with Executive Order 11821 (39 FR 41501, November 29, 1974).

All comments received on or before January 20, 1975 before the close of business on (90 days from date of publication) will be considered. To the extent possible, comments filed after the closing date will also be considered. Comments received pursuant to this proposal will be available for inspection and copying at the U.S. Environmental Protection Agency Public Information Reference Unit, Room 2922 (EPA Library), 401 M Street, S.W., Washington, D.C. 20460.

Final regulations, modified as the Administrator deems appropriate after consideration of comments to the NPRM, will be promulgated as soon as practicable after such consideration.

This notice of proposed rule making is issued under the authority of sections 202, 206, 207, 208 and 301(a) of the Clean Air Act, as amended (42 U.S.C. 1857f-1, 1857f-5, 1857f-5a, 1857f-6, 1857g(a)).

It is hereby certified that the economic and inflationary impacts of this proposed regulation have been carefully evaluated in accordance with OMB Circular A-107.

Dated: October 14, 1975.

JOHN QUARLES,
Administrator.

PART 85—CONTROL OF AIR POLLUTION FROM NEW MOTOR VEHICLES AND NEW MOTOR VEHICLE ENGINES

Subpart E—Emission Regulations for New Motorcycles

Sec.	
85.401	General applicability.
85.402	Definitions.
85.403	Abbreviations.
85.404	General standards; increase in emissions; unsafe conditions.
85.405	Hearings on certification.
85.406	Maintenance of records; submittal of information; right of entry.
85.478-1	Emission standards for 1978 year of production vehicles.
85.478-2	Application for certification.
85.478-3	Approval of application for certification; test fleet selections.
85.478-4	Required data.
85.478-5	Test vehicles.
85.478-6	Maintenance.
85.478-7	Distance accumulation and emission measurements.
85.478-8	Special test procedures.
85.478-9	Test procedures.

Sec.
85.478–10 Gasoline and engine lubricant specifications.
85.478–11 [Reserved]
85.478–12 Vehicle preconditioning.
85.478–13 [Reserved]
85.478–14 Dynamometer driving schedule.
85.478–15 Dynamometer procedure.
85.478–16 Manual transmissions.
85.478–17 [Reserved]
85.478–18 Automatic transmissions.
85.478–19 Engine starting and restarting.
85.478–20 Sampling and analytical system (exhaust emissions).
85.478–21 [Reserved]
85.478–22 Information to be recorded.
85.478–23 Analytical system calibration and sample handling.
85.478–24 Dynamometer test runs.
85.478–25 Chart reading.
85.478–26 Calculations (exhaust emissions).
85.478–27 [Reserved]
85.478–28 Compliance with emission standards.
85.478–29 Testing by the Administrator.
85.478–30 Certification.
85.478–31 Separate certification.
85.478–32 Addition of a vehicle after certification.
85.478–33 Changes to a vehicle covered by certification.
85.478–34 Alternative procedure for amending certificates of conformity.
85.478–35 Labeling.
85.478–36 Submission of vehicle identification numbers.
85.478–37 Production vehicles.
85.478–38 Maintenance instructions.
85.478–39 Submission of maintenance instructions.
85.479–1 Emission standards for 1979 year of production vehicles.
85.480–1 Emission standards for 1980 year of production vehicles.

Subpart E—Emission Regulations for New Motorcycles

§ 85.401 General applicability.

The provisions of this subpart are applicable to new motorcycles except motorcycles with engine displacements less than 50 cc (3.1 cu. in.).

§ 85.402 Definitions.

(a) As used in this subpart, all terms not defined herein shall have the meaning given them in the Act:

(1) "Act" means Part A of title II of the Clean Air Act, 42 U.S.C. 1857 f–1 through f–7, as amended by Pub. L. 91–604.

(2) "Administrator" means the Administrator of the Environmental Protection Agency or his authorized representative.

(3) "Year of production" means the manufacturer's production period (as determined by the Administrator) which includes January 1 of such year and ends no later than December 31 of such year.

(4) "Motorcycle" means any motor vehicle designed to operate on not more than three wheels (including any tricycle arrangement) in contact with the ground which is not a passenger car or passenger car derivative.

(5) "Vehicle curb mass" means the actual or the manufacturer's estimated mass of the vehicle in operational status with all standard equipment and mass of fuel at nominal tank capacity and the mass of any optional equipment on the vehicle.

(6) "Loaded vehicle mass" means the vehicle curb mass of a motorcycle plus 80 kg (176 lb).

(7) "System" includes any motor vehicle modification which controls or causes the reduction of substances emitted from motor vehicles.

(8) "Engine family" means the basic classification unit of a manufacturer's product line used for the purpose of test fleet selection and determined in accordance with § 85.4XX–5(a).[1]

(9) "Engine-system combination" means an engine family-emission control system combination.

(10) "Fuel system" means the combination of fuel tank, fuel pump, fuel lines, oil injection metering system, and carburetor or fuel injection components, and includes all fuel system vents.

(11) "Crankcase emissions" means airborne substances emitted to the atmosphere from any portion of the engine crankcase ventilation or lubrication systems.

(12) "Exhaust emissions" means substances emitted to the atmosphere from any opening downstream from the exhaust port of a motor vehicle engine.

(13) "Engine - system - displacement combination" means an engine family-emission control system-engine displacement combination.

(14) "Zero (0) kilometers (miles)" means that point after initial engine starting (not to exceed 10 km (6.2 mi) of vehicle operation, or one hour of engine operation) at which normal assembly line operations and adjustments are completed.

(15) "Calibrating gas" means a gas of known concentration which is used to establish the response curve of an analyzer.

(16) "Span gas" means a gas of known concentration which is used routinely to set the output level of an analyzer.

(17) "Oxides of nitrogen" means the sum of the nitric oxide and nitrogen dioxide contained in a gas sample as if the nitric oxide were in the form of nitrogen dioxide.

(18) "Useful life" means, for vehicles with engine displacements equal to or greater than 170 cc (10.4 cu. in.), a period of use of 30,000 km (18,641 mi). For vehicles with engine displacements less than 170 cc (10.4 cu. in.), "useful life" means a period of use of 12,000 km (7456 mi).

(19) "Scheduled maintenance" means any adjustment, repair, removal, disassembly, cleaning, or replacement of vehicle components or systems which is performed on a periodic basis to prevent part failure or vehicle malfunction.

(20) "Unscheduled maintenance" means any adjustment, repair, removal, disassembly, cleaning, or replacement of vehicle components or systems which is performed to correct or diagnose a part failure or vehicle malfunction.

(21) "EPA Enforcement Officer" means any officer or employee of the Environmental Protection Agency so designated in writing by the Administrator (or by his designee).

(22) "Auxiliary emission control device" means any element of design which senses temperature, vehicle speed, engine RPM, transmission gear, manifold vacuum, or any other parameter for the purpose of activating, modulating, delaying, or deactivating the operation of any part of the emission control system.

(23) "Defeat device" means an AECD that reduces the effectiveness of the emission control system under conditions which may reasonably be expected to be encountered in normal urban vehicle operation and use, unless (1) such conditions are substantially included in the Federal emission test procedure, or (2) the need for the AECD is justified in terms of protecting the vehicle against damage or accident, or(3) the AECD does not go beyond the requirements of engine starting or warm-up.

(24) As applied to any individual production vehicle, "Conforms, in all material respects, to the design specifications that applied to those vehicles described in the application for certification" means that the description in the appropriate application for certification of the parameters and specifications enumerated in Appendix VIIa is accurate in all respects as applied to that vehicle.

§ 85.403 Abbreviations.

The abbreviations used in this subpart have the following meanings in both capital and lowercase:

Accel.—Acceleration.
AECD—Auxiliary emission control device.
ASTM—American Society for Testing and Materials.
CC—Cubic centimeter(s).
Cfh—Cubic feet per hour.
Cfm—Cubic feet per minute.
Cm—Centimeter(s).
CO—Carbon monoxide.
CO_2—Carbon dioxide.
Conc—Concentration.
Cu.—Cubic.
CVS—Constant volume sampler.
C—Celsius.
Decel.—Deceleration.
EGR—Exhaust gas recirculation.
EP—End point.
EPA—Environmental Protection Agency.
F—Fahrenheit.
Ft—Feet.
Gal—U.S. gallon(s).
G—Gram(s).
GVM—Gross vehicle mass.
HC—Hydrocarbon(s).
Hg—Mercury.
Hi.—High.
H_2O—Water.
HP—Horsepower.
Hr—Hour(s).
ID—Internal diameter.
In.—Inch(es).
K—Kelvin.
Kg—Kilogram(s).
Km—Kilometer(s).
KPa—Kilopascals.
K.p.h.—Kilometers per hour.
L—Liter(s).
Lb—Pound(s).
Lb-ft—Pound-feet.

[1] Normally, the two characters after the period and subpart number are the last two digits of the year of production to which the regulations apply. Since this paragraph number applies to all years of production, the character XX have been substituted for the last two digits of the year of production.

M—Meter(s).
Mi—Mile(s).
Min—Minute(s).
Ml—Milliliter(s).
M.p.h.—Miles per hour.
Mm—Millimeter(s).
Mol—Molecular.
Mv—Millivolt(s).
N—Newton(s).
Nm—Newton-meter(s).
N2—Nitrogen.
NO—Nitric oxide.
NO2—Nitrogen dioxide.
NOx—Oxides of nitrogen.
No.—Number.
N/V—Engine RPM divided by vehicle speed in k.p.h. (m.p.h.) in highest gear.
O2—Oxygen.
Pa—Pascal(s).
Pb—lead.
PCV—Positive crankcase ventilation.
Ppm—Parts per million by volume.
Psi—Pounds per square inch.
Psig—Pounds per square inch gauge.
R—Rankine.
Rev—Revolution(s).
RPM—Revolutions per minute.
S.A.E.—Society of Automotive Engineers.
S—Second(s).
Sp.—Speed.
Sq.—Square.
SS—Stainless steel.
TEL—Tetraethyl lead.
TML—Tetramethyl lead.
V—Volt(s).
Vs.—Versus.
WOT—Wide open throttle.
Wt—Weight.
°—Degree(s).
%—Percent.

§ 85.404 General standards; increase in emissions; unsafe conditions.

(a)(1) Every new motorcycle manufactured for sale, sold, offered for sale, introduced or delivered for introduction into commerce, or imported into the United States for sale or resale which is subject to any of the standards prescribed in this subpart shall be covered by a certificate of conformity issued pursuant to §§ 85.4XX–2 through 85.4XX–4 and §§ 85.4XX–29 through 85.4XX–34 of this subpart.

(b)(1) Any system installed on or incorporated in a new motorcycle to enable such vehicle to conform to standards imposed by this subpart;

(i) Shall not in its operation or function cause the emission into the ambient air of any noxious or toxic substance that would not be emitted in the operation of such vehicle without such system, except as specifically permitted by regulation; and

(ii) Shall not in its operation, function, or malfunction result in any unsafe condition endangering the motorcycle, its riders, or persons or property in close proximity to the vehicle.

(2) Every manufacturer of new motorcycles subject to any of the standards imposed by this subpart shall, prior to taking any of the actions specified in section 203(a)(1) of the Act, test or cause to be tested motorcycles in accordance with good engineering practice to ascertain that such test vehicles will meet the requirements of this section for the useful life of the vehicle.

§ 85.405 Hearings on certification.

(a)(1) After granting a request for a hearing under §§ 85.4XX–3 or 85.4XX–30, the Administrator will designate a Presiding Officer for the hearing.

(2) The General Counsel will represent the Environmental Protection Agency in any hearing under this section.

(3) If a time and place for the hearing have not been fixed by the Administrator under §§ 85.4XX–3 or 85.4XX–30, the hearing shall be held as soon as practicable at a time and place fixed by the Administrator or by the Presiding Officer.

(4) In the case of any hearing requested pursuant to § 85.4XX–30(b)(4)(i), the Administrator may in his discretion direct that all argument and presentation of evidence be concluded within such fixed period not less than 30 days as he may establish from the date that the first written offer of a hearing is made to the manufacturer. To expedite proceedings, the Administrator may direct that the decision of the Presiding Officer (who may, but need not be the Administrator himself) shall be the final EPA decision.

(b)(1) Upon his appointment pursuant to paragraph (a) of this section, the Presiding Officer will establish a hearing file. The file shall consist of the notice issued by the Administrator under §§ 85.4XX–3 or 85.4XX–30, together with any accompanying material, the request for a hearing and the supporting data submitted therewith and all documents relating to the request for certification and all documents submitted therewith, and correspondence and other data material to the hearing.

(2) The appeal file will be available for inspection by the applicant at the office of the Presiding Officer.

(c) An applicant may appear in person, or may be represented by counsel or by any other duly authorized representative.

(d)(1) The Presiding Officer upon the request of any party, or in his discretion, may arrange for a prehearing conference at a time and place specified by him to consider the following:

(i) Simplification of the issues;

(ii) Stipulations, admissions of fact, and the introduction of documents;

(iii) Limitation of the number of expert witnesses;

(iv) Possibility of agreement disposing of all or any of the issues in dispute;

(v) Such other matters as may aid in the disposition of the hearing, including such additional tests as may be agreed upon by the parties.

(2) The results of the conference shall be reduced to writing by the Presiding Officer and made part of the record.

(e)(1) Hearings shall be conducted by the Presiding Officer in an informal but orderly and expeditious manner. The parties may offer oral or written evidence, subject to the exclusion by the Presiding Officer of irrelevant, immaterial and repetitious evidence.

(2) Witnesses will not be required to testify under oath. However, the Presiding Officer shall call to the attention of witnesses that their statements may be subject to the provisions of title 18 U.S.C. 1001 which imposes penalties for knowingly making false statements or representations, or using false documents in any matter within the jurisdiction of any department or agency of the United States.

(3) Any witness may be examined or cross-examined by the Presiding Officer, the parties, or their representatives.

(4) Hearings shall be reported vebatim. Copies of transcripts of proceedings may be purchased by the applicant from the reporter.

(5) All written statements, charts, tabulations, and similar data offered in evidence at the hearing shall, upon a showing satisfactory to the Presiding Officer of their authenticity, relevancy, and materiality, be received in evidence and shall constitute a part of the record.

(6) Oral argument may be permitted in the discretion of the Presiding Officer and shall be reported as part of the record unless otherwise ordered by him.

(f)(1) The Presiding Officer shall make an initial decision which shall include written findings and conclusions and the reasons or basis therefore on all the material issues of fact, law, or discretion presented on the record. The findings, conclusions, and written decision shall be provided to the parties and made a part of the record. The initial decision shall become the decision of the Administrator without further proceedings unless there is an appeal to the Administrator or motion for review by the Administrator within 20 days of the date the initial decision was filed.

(2) On appeal from or review of the initial decision the Administrator shall have all the powers which he would have in making the initial decision including the discretion to require or allow briefs, oral argument, the taking of additional evidence or the remanding to the Presiding Officer for additional proceedings. The decision by the Administrator shall include written findings and conclusions and the reasons or basis therefore on all the material issues of fact, law, or discretion presented on the appeal or considered in the review.

§ 85.406 Maintenance of records; submittal of information; right of entry.

(a) The manufacturer of any new motorcycle subject to any of the standards or procedures prescribed in this subpart shall establish, maintain and retain the following adequately organized and indexed records:

(1) *General records.* (i)(A) Identification and description of all certification vehicles for which testing is required under this subpart.

(B) A description of all emission control systems which are installed on or incorporated in each certification vehicle.

(C) A description of all procedures used to test each such certification vehicle.

(ii) A properly filed application for certification, following the format prescribed by the U.S. EPA for the appropriate year of production, fulfills each of the requirements of this paragraph (a)(1).

(2) *Individual records.* (i) A brief history of each motorcycle used for certification under this subpart in the form of a separate booklet or other document for each separate vehicle in which shall be recorded:

(A) In the case where a current production engine is modified for use in a certification vehicle, a description of the process by which the engine was selected and of the modifications made, giving specifically the place of modification and installation of the engine into the certification vehicle and the person(s) in charge of modification and installation. In the case where the engine for a certification vehicle is not derived from a current production engine, a general description of the buildup of the engine (e.g., experimental heads were cast and machined according to supplied drawings, etc.) giving specifically the place of engine assembly and installation into a certification vehicle and the person(s) in charge of engine assembly and installation. In both cases above, a description of the origin and selection process for the carburetor, fuel system, emission control system components, and exhaust after treatment device shall be included. The required descriptions shall specify the steps taken to assure that the certification vehicle with respect to its engine, drive train, fuel system, emission control system components, exhaust after treatment device, mass or any other device or component that can reasonably be expected to influence exhaust emissions will be representative of production vehicles and that either all components and/or vehicle construction processes, component inspection and selection techniques, and assembly techniques employed in constructing such vehicles are reasonably likely to be implemented for production vehicles or that they are as closely analogous as practicable to planned construction and assembly processes.

(B) A complete record of all emission tests performed under §§ 85.4XX–9 through 85.4XX–27 (except tests performed by EPA directly), including all individual worksheets and/or other documentation relating to each such test, or exact copies thereof; the date, time, purpose, and location of each test; the distance accumulated on the vehicle when the test began and ended; and the names of supervisory personnel responsible for the conduct of the test.

(C) The date and times of each distance accumulation run, listing both the distance accumulated and the name of each rider or each operator of the automatic distance accumulation device.

(D) If used, the record of any devices employed to record the speed and/or distance in relationship to time of the test vehicle.

(E) A record and description of all maintenance and other servicing performed, giving the date and time of the maintenance or service, the reason for it, the person authorizing it, and the names of supervisory personnel responsible for the conduct of the maintenance or service. The description shall indicate whether or not EPA specifically consented to the work and, if EPA did not, shall list the provision of this subpart which authorizes its performance.

(F) A record and description of each test performed to diagnose engine or emissions control system performance, giving the date and time of the test, the reason for it, the person authorizing it, and the names of supervisory personnel responsible for the conduct of the test.

(G) The dates and times that the vehicle was idle in storage, and in transit or transport.

(H) A brief description of any significant events affecting the vehicle during any time in the period covered by the history not described by an entry under one of the previous headings including such extraordinary events as vehicle accidents or rider speeding citations or warnings.

(ii) Each such history shall be started on the date that the first of any of the selection or build up activities in paragraph (a)(2)(i)(a) of this section occurred with respect to the certification vehicle, shall be updated each time the operational status of the vehicle changes or additional work is done on it, and shall be kept in a designated location.

(3) All records required to be maintained under this subpart shall be retained by the manufacturer for a period of six (6) years after issuance of all certificates of conformity to which they relate. Records may be retained as hard copy or reduced to microfilm, punch cards, etc., depending on the record retention procedures of the manufacturer: *Provided*, That in every case all the information contained in the hard copy shall be retained.

(b) The manufacturer of any new motorcycle subject to any of the standards prescribed in this subpart shall submit to the Administrator at the time of issuance by the manufacturer copies of all instructions or explanations regarding the use, repair, adjustment, maintenance, or testing of such vehicle relevant to the control of crankcase or exhaust emissions, issued by the manufacturer for use by other manufacturers, assembly plants, distributors, dealers, and ultimate purchasers: Provided, That any material not translated into the English language need not be submitted unless specifically requested by the Administrator.

(c)(1) Any manufacturer who has applied for certification of a new motorcycle subject to certification tests under this subpart shall admit or cause to be admitted any EPA Enforcement Officer during operating hours on presentation of credentials to any of the following:

(i) Any facility where any such tests or any procedures or activities connected with such tests are or were performed.

(ii) Any facility where any new motorcycle which is being, was, or is to be tested is present.

(iii) Any facility where any construction process or assembly process used in the modification or build up of such a vehicle into a certification vehicle is taking place or has taken place.

(iv) Any facility where any record or other document relating to any of the above is located.

(2) Upon admission to any facility referred to in paragraph (c)(1) of this section, any EPA Enforcement Officer shall be allowed:

(i) To inspect and monitor any part or aspect of such procedures, activities, and testing facilities, including, but not limited to, monitoring vehicle preconditioning, emissions tests and distance accumulation, maintenance, and vehicle soak and storage procedures; and to verify correlation or calibration of test equipment;

(ii) To inspect and make copies of any such records, designs, or other documents; and

(iii) To inspect and/or photograph any part or aspect of any such certification vehicle and any components to be used in the construction thereof.

(3) In order to allow the Administrator to determine whether or not production motorcycles conform in all material respects to the design specifications which applied to those vehicles described in the application for certification for which a certificate of conformity has been issued and to standards prescribed under section 202 of the Act, any manufacturer shall admit any EPA Enforcement Officer on presentation of credentials to both:

(i) Any facility where any document, design, or procedure relating to the translation of the design and construction of engines and emission related components described in the application for certification or used for certification testing into production vehicles is located or carried on; and

(ii) Any facility where any motorcycles to be introduced into commerce are manufactured or assembled.

(4) On admission to any such facility referred to in paragraph (c)(3) of this section, any EPA Enforcement Officer shall be allowed:

(i) To inspect and monitor any aspects of such manufacture or assembly and other procedures;

(ii) To inspect and make copies of any such records, documents or designs; and

(iii) To inspect and photograph any part or aspect of any such new motorcycles and any component used in the assembly thereof that are reasonably related to the purpose of his entry.

(5) Any EPA Enforcement Officer shall be furnished by those in charge of a facility being inspected with such reasonable assistance as he may request to help him discharge any function listed in this paragraph. Each applicant for or recipient of certification is required to cause those in charge of a facility operated for its benefit to furnish such reasonable assistance without charge to EPA whether or not the applicant controls the facility.

(6) The duty to admit or cause to be admitted any EPA Enforcement Officer applies whether or not the applicant owns or controls the facility in question and applies both to domestic and to foreign manufacturers and facilities. EPA will not attempt to make any inspections which it has been informed that local law forbids. However, if local law makes it impossible to do what is necessary to insure the accuracy of data generated

at a facility, no informed judgment that a vehicle or engine is certifiable or is covered by a certificate can properly be based on that data. It is the responsibility of the manufacturer to locate its testing and manufacturing facilities in jurisdictions where this situation will not arise.

(7) For purposes of this paragraph:

(i) 'Presentation of credentials" shall mean display of the document designating a person as an EPA Enforcement Officer.

(ii) Where vehicle, component, or engine storage areas or facilities are concerned, "operating hours" shall mean all times during which personnel other than custodial personnel are at work in the vicinity of the area or facility and have access to it.

(iii) Where facilities or areas other than those covered by paragraph (c)(7)(ii) of this section are concerned, "operating hours" shall mean all times during which an assembly line is in operation or all times during which testing, maintenance, distance accumulation, production or compilation of records, or any other procedure or activity related to certification testing, to translation of designs from the test stage to the production stage, or to vehicle manufacture or assembly is being carried out in a facility.

(iv) "Reasonable assistance" includes, but is not limited to, clerical, copying, interpretation and translation services, the making available on request of personnel of the facility being inspected during their working hours to inform the EPA Enforcement Officer of how the facility operates and to answer his questions, and the performance on request of emissions tests on any vehicle which is being, has been, or will be used for certification testing. Such tests shall be nondestructive, but may require appropriate distance accumulation. A manufacturer may be compelled to cause the personal appearance of any employee at such a facility before an EPA Enforcement Officer by written request for his appearance, signed by the Assistant Administrator for Enforcement, served on the manufacturer. Any such employee who has been instructed by the manufacturer to appear will be entitled to be accompanied, represented, and advised by counsel. No counsel who accompanies, represents, or advises an employee compelled to appear may accompany, represent, or advise any other person in the investigation.

(v) Any entry without 24 hour prior written or oral notification to the affected manufacturer shall be authorized in writing by the Assistant Administrator for Enforcement.

§ 85.478–1 Emission standards for 1978 year of production vehicles.

(a)(1) Exhaust emissions from 1978 year of production motorcycles shall not exceed:

(i) Hydrocarbons.

(A) For vehicles with engine displacements equal to or greater than 50 cc (3.1 cu. in.) but less than 170 cc (10.4 cu. in.), 5.0 grams per vehicle kilometer.

(B) For vehicles with engine displacements equal to or greater than 170 cc (10.4 cu. in.) but less than 750 cc (45.8 cu. in.), the standard computed by use of the following formula:

$$\text{Hydrocarbon standard in grams per vehicle kilometer} = 5 + 0.0155 \times (D - 170).$$

where:

D=engine displacement of the motorcycle in cubic centimeters, rounded to the nearest whole cubic centimeter in accordance with ASTM E 29–67. The hydrocarbon standard shall be rounded, in accordance with ASTM E 29–67, to two significant figures.

(C) For vehicles with engine displacements equal to or greater than 750 cc (45.8 cu. in.), 14 grams per vehicle kilometer.

(ii) Carbon monoxide. 17 grams per vehicle kilometer.

(iii) Oxides of nitrogen. 1.2 grams per vehicle kilometer.

(2) The standards set forth in paragraph (a)(1) of this section refer to the exhaust emitted over driving schedules as set forth in §§ 85.478–9 through 85.478–26 and measured and calculated in accordance with those procedures.

(b) No crankcase emissions shall be discharged into the ambient atmosphere from any new motorcycle subject to this subpart.

§ 85.478–2 Application for certification.

(a) An application for a certificate of conformity shall be made for each set of standards applicable to new motorcycles. Such application shall be made to the Administrator by the manufacturer and shall be updated and corrected by amendment.

(b) The application shall be in writing, signed by an authorized representative of the manufacturer, and shall include the following:

(1) Identification and description of the vehicles covered by the application and a description of their engine, emission control system and fuel system components including the applicable parameters and specifications of Appendix VIIa. This shall include a detailed description of each auxiliary emission control device to be installed in or on any certification test vehicle.

(2) Projected U.S. sales data sufficient to enable the Administrator to select a test fleet representative of the vehicles for which certification is requested.

(3) A description of the test equipment, fuel, and engine lubricant proposed to be used.

(4) A description of the proposed distance accumulation procedure for durability testing, and a description of the proposed scheduled maintenance to be performed on durability data vehicles.

(5) A statement of recommended maintenance and procedures necessary to assure that the vehicles covered by a certificate of conformity in operation conform to the regulations, and a description of the program for training of personnel for such maintenance, and the equipment required.

(c) Complete copies of the application and of any amendments thereto, and all notifications under §§ 85.478–32, 33, and 34 shall be submitted in such multiple copies as the Administrator may require.

§ 85.478–3 Approval of application for certification; test fleet selections.

(a) After a review of the application for certification and any other information which the Administrator may require, the Administrator may approve the application and select a test fleet in accordance with § 85.478–5.

(b) The Administrator may disapprove in whole or in part an application for certification for reasons including incompleteness, inaccuracy, inappropriate proposed distance accumulation procedures, test equipment, or fuel, and incorporation of defeat devices in vehicles described by the application.

(c) Where any part of an application is rejected, the Administrator shall notify the manufacturer in writing and set forth the reasons for such rejection. Within 30 days following receipt of such notification, the manufacturer may request a hearing on the Administrator's determination. The request shall be in writing, signed by an authorized representative of the manufacturer and shall include a statement specifying the manufacturer's objections to the Administrator's determinations, and data in support of such objections. If, after the review of the request and supporting data, the Administrator finds that the request raises a substantial factual issue, he shall provide the manufacturer a hearing in accordance with § 85.405 with respect to such issue.

§ 85.478–4 Required data.

The manufacturer shall perform the tests required by the applicable test procedures, and submit to the Administrator the following information:

(a) Durability data on such vehicles tested in accordance with the applicable test procedures of this subpart, and in such numbers as therein specified, which will show the performance of the systems installed on or incorporated in the vehicle for extended distance as well as a record of all pertinent maintenance performed on the test vehicles.

(b) Emission data on such vehicles tested in accordance with the applicable emission test procedures of this subpart and in such numbers as therein specified, which will show their emissions at zero kilometers and at the official emission data test point for that size vehicle (equal to or greater than 170 cc (10.4 cu. in.)—3500 km (2175 mi); less than 170 cc (10.4 cu. in.)—2500 km (1553 mi)).

(c) A statement that the description of tests performed to ascertain compliance with the general standards in § 85.404 and the data derived from such tests are available to the Administrator upon request.

(d) A statement that the test vehicles with respect to which data are available and are submitted to demonstrate compliance with §§ 85.404 and 85.478–1 have been tested in accordance with the applicable test procedures, that they meet the requirements of such tests, and that,

on the basis of such tests, they conform to the requirements of the regulations in this subpart. If such statements cannot be made with respect to any vehicle tested, the vehicle shall be identified, and all pertinent test data relating thereto shall be supplied.

§ 85.478–5 Test vehicles.

(a) (1) The vehicles covered by the application for certification will be divided into groupings of vehicles whose engines are expected to have similar emission characteristics throughout their useful life. Each group of engines with similar emission characteristics shall be defined as a separate engine family.

(2) (i) To be classed in the same engine family, reciprocating engines must be identical in all of the following applicable respects:

(A) The combustion cycle.

(B) The cooling mechanism.

(C) The cylinder configuration (inline, vee, opposed, etc.).

(D) The number of cylinders.

(E) The engine displacement category (equal to or greater than 170 cc (10.4 cu. in.), or less than 170 cc (10.4 cu. in.).

(F) The method of air aspiration.

(G) The catalytic converter characteristics.

(H) The thermal reactor characteristics.

(ii) To be classed in the same engine family, rotary combustion cycle engines must be identical in all of the following applicable respects:

(A) The major axis of the epitrochoidal curve.

(B) The minor axis of the epitrochoidal curve.

(C) The generating radius of the epitrochoidal curve.

(D) The cooling mechanism.

(E) The number of rotors.

(F) The engine displacement category (equal to or greater than 170 cc (10.4 cu. in.), or less than 170 cc (10.4 cu. in.)).

(G) The method of air aspiration.

(H) The catalytic converter characteristics.

(I) The thermal reactor characteristics.

(3) (i) Reciprocating engines identical in all the respects listed in paragraph (2) (i) of this section may be further divided into different engine families if the Administrator determines that they may be expected to have different emission characteristics. This determination will be based upon a consideration of features such as:

(A) The bore and stroke.

(B) The combustion chamber configuration.

(C) The intake and exhaust timing method of actuation (poppet valve, reed valve, rotary valve, etc.).

(D) The intake and exhaust valve and port sizes.

(E) The fuel system.

(F) The exhaust system.

(ii) Rotary combustion cycle engines identical in all the respects listed in paragraph (2) (ii) of this section may be further divided into different engine families if the Administrator determines that they may be expected to have different emission characteristics. This determination will be based upon a consideration of features such as:

(A) The width of the rotor housing.

(B) The type and location of intake port (side, peripheral, combination, etc.).

(C) The type and location of exhaust port (side, peripheral, combination, etc.).

(D) The number of spark plugs per rotor.

(E) The fuel system.

(F) The exhaust system.

(4) Where engines are of a type which cannot be divided into engine families based upon the criteria listed in subparagraphs (2) and (3) of this paragraph, the Administrator will establish families for those engines based upon the features most related to their emission characteristics.

(b) *Emission data vehicles:* (1) Vehicles will be chosen to be operated and tested for emission data based upon the engine-system combination groupings. Within each engine-system combination, the requirements of this paragraph must be met. The configuration of the vehicles selected will be specified by the Administrator.

(2) Vehicles of each engine-system combination will be divided into engine-system-displacement combinations. One vehicle of each engine-system-displacement combination will be selected. If there is only one engine-system-displacement combination in the engine-system combination, then two vehicles of that engine-system-displacement combination may be selected.

(3) The Administrator may select a maximum of four additional vehicles within each engine-system combination based upon features indicating that they may have the highest emission levels of the vehicles in that engine-system combination. In selecting these vehicles, the Administrator will consider the design specifications listed in the application for certification.

(c) *Durability data vehicles:* (1) A durability data vehicle will be selected by the Administrator to represent each engine-system combination. The vehicle selected usually will be of the engine displacement with the largest projected sales volume of vehicles with that control system combination in that engine family, and the configuration of the vehicle will be designated by the Administrator.

(2) A manufacturer may elect to operate and test additional vehicles to represent any engine-system combination. The additional vehicles must be of the same configuration as the vehicle selected for that engine-system combination in accordance with the provisions of paragraph (c) (1) of this section. Written notice of a commitment to operate and test additional vehicles shall be given to the Administrator not later than 30 days following notification of the test fleet selection.

(d) For purposes of testing under § 85.478–7(h), the Administrator may require additional emission data vehicles and durability data vehicles identical in all material respects to vehicles selected in accordance with paragraphs (b) and (c) of this section: Provided, That the number of vehicles selected shall not increase the size of either the emission data fleet or the durability data fleet by more than 20 percent or one vehicle, whichever is greater.

(e) Any manufacturer whose projected sales of new motorcycles subject to this subpart for the year of production for which certification is sought is less than 10,000 vehicles may request the Administrator to specify deterioration factors to be applied to his emission data vehicles, rather than develop deterioration factors through the operation of durability data vehicles as otherwise required by § 85.478–7(b), and also may request a reduction in the number of emission data vehicles determined in accordance with the foregoing provisions of this section. The Administrator may agree to specify a deterioration factor, and to reduce the number of emission data vehicles, as he determines would meet the objectives of the certification requirement.

(f) In lieu of testing an emission data or durability data vehicle selected under paragraph (b) or (c) of this section and submitting data therefore, a manufacturer may, with the prior written approval of the Administrator, submit data on a similar vehicle for which certification has previously been sought.

§ 85.478–6 Maintenance.

(a) (1) Scheduled maintenance on the engine, emission control system, and fuel system of durability or emission data vehicles shall be scheduled for performance at the same distance intervals that will be specified in the manufacturer's maintenance instructions furnished to the ultimate purchaser of the motorcycle. Such maintenance shall be performed, except as provided in paragraph (a) (4) (iii) of this section, only under the following provisions:

(i) Scheduled major engine tuneups to manufacturer's specifications may be performed no more frequently than every 4000 km (2485 mi) of scheduled driving for vehicles with engine displacements equal to or greater than 170 cc (10.4 cu. in.), or no more frequently than every 3000 km (1864 mi) of scheduled driving for vehicles with engine displacements less than 170 cc (10.4 cu. in.): Provided, That no tuneup may be performed after 28,000 km (17,398 mi) of scheduled driving for vehicles with engine displacements equal to or greater than 170 cc (10.4 cu. in.), or no tuneup may be performed after 10,500 km (6524 mi) of scheduled driving for vehicles with engine displacements less than 170 cc (10.4 cu. in.). A scheduled major engine tuneup shall be restricted to paragraph (a) (1) (i) (a) through (j) of this section and shall be conducted in a manner consistent with service instructions and specifications provided by the manufacturer for use by customer service personnel. The following items may be inspected, replaced, cleaned, adjusted, and/or serviced as required:

(A) Ignition system.

(B) Cold starting enrichment system.

(C) Curb idle speed and idle air/fuel mixture.

(D) Valve lash.

(E) Inlet air and exhaust gas control valves.

(F) Engine bolt torque.

(G) Spark plugs.

(H) Crankcase emission control system.

(I) Oil injection metering system.

(J) Exhaust silencing system.

(ii) Change of engine and transmission oil, and change or service of oil, air, and fuel filters will be allowed at the same distance intervals that will be specified in the manufacturer's maintenance instructions.

(2) Manufacturers may service the EGR system as unscheduled maintenance a maximum of two times during the durability distance accumulation if failure of the EGR system activates an audible and/or visual signal approved by the Administrator which alerts the vehicle operator to the need for EGR system maintenance. One additional servicing may also be performed as unscheduled maintenance if there is an overt indication of malfunction and if the malfunction or repair of the malfunction does not render the test vehicle unrepresentative of vehicles in use.

(3) The catalytic converter may be serviced as unscheduled maintenance only once during the durability distance accumulation if failure of the catalytic converter activates an audible and/or visual signal approved by the Administrator which alerts the vehicle operator to the need for catalytic converter maintenance.

(4) Any other engine, emission control system, or fuel system adjustment, repair, removal, disassembly, cleaning, or replacement on durability or emission data vehicles shall be performed only with the advance approval of the Administrator.

(i) In the case of unscheduled maintenance, such approval will be given if the Administrator:

(A) Has made a preliminary determination that part failure or system malfunction, or the repair of such failure or malfunction, does not render the vehicle unrepresentative of vehicles in use, and does not require direct access to the combustion chamber, except for spark plug, fuel injection component, or removable prechamber removal or replacement; and

(B) Has made a determination that the need for maintenance or repairs is indicated by an overt indication of malfunction such as persistent misfire, vehicle stall, overheating, fluid leakage, loss of oil pressure, or charge indicator warning.

(ii) Emission measurements may not be used as a means of determining the need for unscheduled maintenance under paragraph (a) (4) (i) (a).

(iii) Requests for authorization of scheduled maintenance of emission control related components not specifically authorized to be maintained by these regulations must be made prior to the beginning of distance accumulation. The Administrator will approve the performance of such maintenance if the manufacturer makes a satisfactory showing that the maintenance will be performed on vehicles in use or that the maintenance is reasonable and necessary.

(5) If the Administrator determines that part failure or system malfunction occurrence and/or repair rendered the vehicle unrepresentative of vehicles in use, the vehicle shall not be used as a durability or emission data vehicle.

(6) Where the Administrator agrees under § 85.478–7 to a distance accumulation of less than 30,000 km (18,641 mi) for durability testing for vehicles with engine displacements equal to or greater than 170 cc (10.4 cu. in.), or to a distance accumulation of less than 12,000 km (7456 mi) for durability testing for vehicles with engine displacements less than 170 cc (10.4 cu. in.), he may modify the requirements of this paragraph.

(b) Repairs to vehicle components of durability or emission data vehicles, other than the engine, emission control system, or fuel system, shall be performed only as a result of part failure, vehicle system malfunction, or with the advance approval of the Administrator.

(c) Complete emission tests (see §§ 85.478–9 through 85.478–27) are required, unless waived by the Administrator, before and after any vehicle maintenance which may reasonably be expected to affect emissions. These test data shall be air posted to the Administrator within 24 hours (or delivered within 3 working days), after the tests, along with a complete record of all pertinent maintenance, including a preliminary engineering report of any malfunction diagnosis and the corrective action taken. A complete engineering report shall be delivered or air posted to the Administrator within 10 working days after the tests. In addition, all test data and maintenance reports shall be compiled and provided to the Administrator in accordance with § 85.478–4.

(d) The Administrator shall be given the opportunity to verify the existence of an overt indication of part failure and/or vehicle malfunction (e.g., misfire, stall), or an activation of an audible and/or visual signal, prior to the performance of any maintenance to which such overt indication or signal is relevant under the provisions of this section.

(e) Equipment, instruments, or tools may not be used to identify malfunctioning, maladjusted, or defective engine components unless the same or equivalent equipment, instruments, or tools will be available to dealerships and other service outlets and

(1) Are used in conjunction with scheduled maintenance on such components,

(2) Are used subsequent to the identification of a vehicle or engine malfunction, as provided in paragraph (a) (4) (i) of this section for durability or emission data vehicles, or

(3) Unless specifically authorized by the Administrator.

§ 85.478–7 Distance accumulation and emission measurements.

The procedure for distance accumulation will be the Durability Driving Schedule as specified in Appendix IV to this part. A modified procedure may also be used if approved in advance by the Administrator. Except with the advance approval of the Administrator, all vehicles will accumulate distance at a measured curb mass which is within 4 kg (8.8 lb) of the estimated curb mass. If the loaded vehicle mass is within 4 kg (8.8 lb) of being included in the next higher inertial mass category as specified in § 85.478–15 (d), the manufacturer may elect to conduct the respective emission data vehicle test at the inertial mass corresponding to the higher loaded vehicle mass.

(a) Emission data vehicles: Each emission data vehicle shall be driven 3500 km (2175 mi) if the engine displacement is equal to or greater than 170 cc (10.4 cu. in.), or 2500 km (1553 mi) if the engine displacement is less than 170 cc (10.4 cu. in.) with all emission control systems installed and operating. Emission tests shall be conducted at zero kilometers and 3500 kilometers (2175 mi) for vehicles with engine displacements equal to or greater than 170 cc (10.4 cu. in.), or at zero kilometers and 2500 kilometers (1553 mi) for vehicles with engine displacements less than 170 cc (10.4 cu. in.).

(b) Durability data vehicles: Each durability data vehicle shall be driven with all emission control systems installed and operating, for 30,000 km (18,641 mi) for vehicles with engine displacements equal to or greater than 170 cc (10.4 cu. in.), or for 12,000 km (7456 mi) for vehicles with engine displacements less than 170 cc (10.4 cu. in.), or for such lesser distance as the Administrator may agree to as meeting the objectives of this procedure. Complete emission tests (see §§ 85.478–10 through 85.478–26) shall be made at the following distance points: 0, 5000, 10,000, 15,000, 20,000, 25,000, and 30,000 kilometers (0, 3107, 6214, 9321, 12,427, 15,534, and 18,641 mi) for vehicles with engine displacements equal to or greater than 170 cc (10.4 cu. in.), or 0, 1500, 3000, 4500, 6000, 7500, 9000, 10,500, and 12,000 kilometers (0, 932, 1864, 2796, 3728, 4660, 5592, 6524, and 7456 mi) for vehicles with engine displacements less than 170 cc (10.4 cu. in.).

(c) Distance accumulation for emission data and durability data vehicles shall be conducted in increments of time, the sum of which shall not exceed a total of 12 hours of operation. A non-operating soak period of not less than 12 hours is required following each 12 hour total operating sequence. Engine shut downs are allowed while accumulating the 12 hour total operating sequence. Shut downs occurring before the accumulation of a 12 hour total operating sequence which exceed 12 hours may be considered as non-operating soak periods, and the next operating sequence may continue for 12 hours. During the non-operating soak period, the vehicle shall be exposed to normal outside ambient temperature and humidity conditions unless vehicle maintenance or servicing is being performed.

(d) All tests required by this subpart must be conducted at any accumulated distance within 250 kilometers (155 mi) of each of those test points.

(e) (1) Data from all tests (including voided tests) shall be air posted to the Administrator within 24 hours (or delivered within three working days). In addition, all test data shall be compiled and provided to the Administrator in accordance with § 85.478–4. Failure to comply with these requirements may invalidate all test data submitted for this test vehicle.

(2) The manufacturer shall furnish to the Administrator explanation for voiding any test. The Administrator will determine if voiding the test was appropriate based upon the explanation given by the manufacturer for the voided test. If the Administrator determines that voiding the test was not appropriate, the Administrator may require that the data from that test be used in the calculation of the deterioration factor.

(3) If a manufacturer conducts multiple tests at any test point at which the data are intended to be used in the calculation of the deterioration factor, the number of tests must be the same at each such point and may not exceed three valid tests. Tests between test points may be conducted as required by the Administrator. Where the Administrator conducts a valid test on a durability vehicle at a prescribed test point, the results shall be used in the calculation of the deterioration factor.

(4) The results of all emission tests shall be rounded, using the "Rounding-Off Method" specified in ASTM E 29–67, to the number of places to the right of the decimal point indicated by expressing the applicable standard in § 85.478–1 to three significant figures.

(f) Whenever the manufacturer proposes to operate and test a vehicle which may be used for emission or durability data, he shall provide the zero distance test data and the zero distance documents as required by the Administrator, and make the vehicle available for such testing under § 85.478–29 or inspection as the Administrator may require before beginning to accumulate test distance on the vehicle. Distance accumulation shall not begin until authorized by the Administrator. Failure to comply with these requirements will invalidate all test data submitted for this vehicle.

(g) Once a manufacturer begins to operate an emission data or durability data vehicle, as indicated by compliance with paragraph (f) of this section, the data from the vehicle will be used, unless specified otherwise by the Administrator, in the calculations under § 85.478–28. Discontinuation of a vehicle shall be allowed only with the written consent of the Administrator.

(h) (1) The Administrator may elect to operate and test any test vehicle during all or any part of the distance accumulation and testing procedure. In such cases, the manufacturer shall provide the vehicle(s) to the Administrator with all information necessary to conduct this testing.

(2) The test procedures in §§ 85.478–9 through 85.578–27 will be followed by the Administrator. The Administrator will test the vehicles at each test point which occurs while the vehicle is in the Administrator's possession. Maintenance may be performed by the manufacturer under such conditions as the Administrator may prescribe.

(3) The data developed by the Administrator for the engine-system combination shall be combined with any applicable data supplied by the manufacturer on other vehicles of that combination to determine the applicable deterioration factors for the combination. In the case of a significant discrepancy between data developed by the Administrator and that submitted by the manufacurer, the Administrator's data shall be used in the determination of deterioration factors.

(i) Emission testing of any type with respect to any certification vehicle other than that specified in this subpart is not allowed except as such testing may be specifically authorized by the Administrator.

§ 85.478–8 Special test procedures.

The Administrator may, on the basis of a written application therefor by a manufacturer, prescribe test procedures, other than those set forth in this subpart, for any motorcycle which he determines is not susceptible to satisfactory testing by the procedures set forth herein.

§ 85.478–9 Test procedures.

The procedures described in this and subsequent sections will be the test program to determine the conformity of motorcycles with the standards set forth in § 85.478–1.

(a) The test consists of prescribed sequences of fueling, parking, and operating conditions. The exhaust gases generated during vehicle operation are diluted with air and sampled continuously for subsequent analysis of specific components by prescribed analytical techniques. The test applies to vehicles equipped with catalytic or direct flame afterburners, induction system modifications, or other systems or to uncontrolled vehicles and engines. All test phases are conducted with an ambient temperature range between 20° and 30°C (68° and 86°F).

(b) The exhaust emission test is designed to determine hydrocarbon, carbon monoxide, and oxides of nitrogen mass emissions while simulating an average trip in an urban area. The test consists of engine startups and vehicle operation on a chassis dynamometer through a specified driving schedule, as described in Appendix I to this part. A proportional part of the diluted exhaust emissions is collected continuously, for subsequent analysis, using a constant volume (variable dilution) sampler.

(c) Except in cases of component malfunction or failure, all emission control systems installed on or incorporated in a new motorcycle shall be functioning during all procedures in this subpart. Maintenance to correct component malfunction or failure shall be authorized in accordance with § 85.478–6.

§ 85.478–10 Gasoline and engine lubricant specifications.

(a) Fuel having the following specifications will be used by the Administrator in exhaust emission testing. Fuels having the following specifications or substantially equivalent specifications approved by the Administrator, shall be used by the manufacturer in exhaust emission testing, except that the lead and octane specifications do not apply.

Item	ASTM designation	Leaded	Unleaded
Octane, research minimum	D2699	100	96.
Pb (organic), gram/liter (grams/U.S. gallon)		0.370 (1.4) minimum	0.000–0.013 (0.00–0.05).
Distillation range	D86		
IBP, °C (°F)		23.9–35 (75–95)	23.9–35 (75–95).
10 pct point, °C (°F)		48.9–57.2 (120–135)	48.9–57.2 (120–135).
50 pct point, °C (°F)		93.3–110 (200–230)	93.3–110 (200–230).
90 pct point, °C (°F)		148.9–162.8 (300–325)	148.9–162.8 (300–325).
EP, °C (°F), maximum		212.8 (415)	212.8 (415).
Sulfur, mass percent, maximum	D1266	0.10	0.10.
Phosphorus, gram/liter (gram/U.S. gallon), maximum.		0.0026 (0.01)	0.0013 (0.005).
RVP, kPa (psi)	D323	55.2–63.4 (8.0–9.2)	55.2–63.4 (8.0–9.2).
Hydrocarbon composition	D1319		
Olefins, percent, maximum		10	10.
Aromatics, percent maximum		35	45.
Saturates		Remainder	Remainder.

(b) Fuels and engine lubricants representative of commercial fuels and engine lubricants which will be generally available through retail outlets shall be used in distance accumulation. For unleaded fuel, the minimum lead content shall be 0.005 gram per liter (0.02 gram per U.S. gallon) and the minimum phosphorus content shall be 0.0005 gram per liter (0.002 gram per U.S. gallon). For leaded fuel, the minimum lead content shall be 0.370 gram per liter (1.4 grams per U.S. gallon), except that where the Administrator determines that vehicles represented by a test vehicle will be operated using fuels of different lead content than that prescribed in this paragraph, he may consent in writing to use of a fuel with a different lead content. The octane rating of the fuel used shall be no higher than 4.0 Research octane numbers above the minimum recommended by the manufacturer. The Reid Vapor Pressure of the fuel used shall be characteristic of the motor fuel during the season which the distance accumulation takes place.

(c) The specification range of the fuels and engine lubricants to be used under paragraph (b) of this section shall be reported in accordance with § 85.478–2 (b) (3).

§ 85.478–11 [Reserved]

§ 85.478–12 Vehicle preconditioning.

Vehicles to be tested for compliance with the exhaust emission standards of this subpart shall be preconditioned as follows:

(a) The fuel tank of the test vehicle shall be drained and charged with the specified test fuel, § 85.478–10(a).

(b) The test vehicle shall be placed on the dynamometer and may be used to set dynamometer power, if necessary. The test vehicle shall be operated over a simulated trip, according to the applicable requirements and procedures of §§ 85.478–14 to 85.478–19 except that the engine need not be cold when starting the run on the dynamometer and only a single simulated trip shall be run.

(c) The engine and cooling fan shall be stopped upon completion of the dynamometer operation and the vehicle permitted to soak either on or off the dynamometer stand for a period of not less than 12 hours prior to the dynamometer test. If the vehicle is to be soaked off the dynamometer stand, no engine operation will be permitted during removal for the soak or during replacement for the dynamometer run as specified in § 85.478–15(a).

§ 85.478–13 [Reserved]

§ 85.478–14 Dynamometer driving schedule.

(a) The dynamometer driving schedule to be followed consists of a nonrepetitive series of idle, acceleration, cruise, and deceleration modes of various time sequences and rates. The driving schedule for vehicles with engine displacements equal to or greater than 170 cc (10.4 cu. in.) is defined by a smooth transition through the speed vs. time relationships listed in Appendix I (a) to this subpart. The driving schedule for vehicles with engine displacements less than 170 cc (10.4 cu. in.) is defined by a smooth transition through the speed vs. time relationships listed in Appendix I(b) to this subpart. The time sequence begins upon starting the vehicle according to the startup procedure described in § 85.478–19.

(b) The speed tolerance at any given time on the dynamometer driving schedule prescribed in Appendix I or as printed on a driver's aid chart approved by the Administrator, when conducted to meet the requirements of § 85.478–15, is defined by upper and lower limits. The upper limit is 3.2 k.p.h. (2.0 m.p.h.) higher than the highest point on the trace within 1 second of the given time. The lower limit is 3.2 k.p.h. (2.0 m.p.h.) lower than the lowest point on the trace within 1 second of the given time. Speed variations greater than the tolerances (such as occur when shifting manual transmission vehicles) are acceptable provided they occur for less than 2 seconds on any one occasion. Speeds lower than those prescribed are acceptable provided the vehicle is operated at maximum available power during such occurrences. Further, speed deviations from those prescribed which are due to stalling are acceptable provided the provisions of § 85.478–19(g) are met. When conducted to meet the requirements of § 85.478–12, the speed tolerance shall be as specified above, except that the upper and lower limits shall be 6.5 k.p.h. (4.0 m.p.h.).

§ 85.478–15 Dynamometer procedure.

(a) The dynamometer run consists of two tests, a "cold" start test after a minimum 12 hour soak according to the provisions of § 85.478–12 and a "hot" start test with a 10 minute soak between the two tests. Engine startup (with all accessories turned off), operation over the driving schedule, and engine shutdown make a complete cold start test. Engine startup and operation over the first 505 seconds of the driving schedule complete the hot start test. The exhaust emissions are diluted with air to a constant volume and a portion is sampled continuously during each test. The composite samples collected in bags are analyzed for hydrocarbons, carbon monoxide, carbon dioxide, and oxides of nitrogen. A parallel sample of the dilution air is similarly analyzed for hydrocarbon monoxide, and oxides of nitrogen.

(b) During dynamometer operation, a variable speed cooling blower shall be positioned in front of the vehicle so as to direct cooling air to the vehicle in a manner which simulates actual operating conditions. The blower shall have a mechanism (such as variable area air inlet(s)) which is controlled by dynamometer roll speed such that within the operating range of 10 k.p.h. (6.2 m.p.h.) to 70 k.p.h. (43.5 m.p.h.) the linear velocity of the air at the blower outlet is within 10 percent of the corresponding roll speed. At roll speeds of less than 10 k.p.h. (6.2 m.p.h.), air velocity shall be between zero and 10 k.p.h. (6.2 m.p.h.). The maximum linear air velocity from the cooling blower shall be at least 70 k.p.h. (43.5 m.p.h.). The blower outlet shall have a cross sectional area of at least 0.40 m^2 (4.31 ft^2), and the bottom of the blower outlet shall be between 0.15 m (0.49 ft) and 0.2 m, 0.66 ft) above floor level. The blower outlet shall be squarely positioned between 0.3 m (0.98 ft) and 0.45 m (1.48 ft) in front of the vehicle's front wheel.

(c) The vehicle shall be nearly level when tested in order to prevent abnormal fuel distribution.

(d) (1) Flywheels, electrical or other means of simulating inertia with inertial increments no greater than those shown in the following table shall be used.

Loaded vehicle mass, kilograms	*Equivalent inertial mass kilograms*
136 to 145	140
146 to 155	150
156 to 165	160
166 to 175	170
176 to 185	180
186 to 195	190
196 to 205	200
206 to 215	210
216 to 225	220
226 to 235	230
236 to 245	240
246 to 255	250
256 to 265	260
266 to 275	270
276 to 285	280
286 to 295	290
296 to 305	300
306 to 315	310
316 to 325	320
326 to 335	330
336 to 345	340
346 to 355	350
356 to 365	360
366 to 375	370
376 to 385	380
386 to 395	390
396 to 405	400
406 to 415	410
416 to 425	420
426 to 435	430
436 to 445	440
446 to 455	450
456 to 465	460
466 to 475	470
476 to 485	480

(2) The road load power shall be calculated to 3 significant figures from the following formula:

$$P = 0.005934I + 1.58458$$

where:

P = Road load power at 65 k.p.h., in kilowatts.

I = Actual loaded vehicle mass, in kilograms.

(3) Motorcycles with loaded vehicle mass outside the limits specified in § 85.478–15(d)(1) shall be tested at an equivalent inertial mass and road load power specified by the Administrator.

(e) *Power absorption unit adjustment.* (1) The power absorption unit shall be adjusted to reproduce road load power at 65 k.p.h. (40.4 m.p.h.) true speed. The indicated road load power setting shall take into account the dynamometer friction. The relationship between road load (absorbed) power and indicated road load power for a particular dynamometer shall be determined by the procedure outlined in Appendix II or by other suitable means.

(2) The road load power calculated from the formula above shall be used or the vehicle manufacturer may determine the road load power by one of the following procedures or other procedure approved in advance by the Administrator and request that it be used.

(i) (A) Measure the force at some point in the vehicle drive line of a representative vehicle and rider of the same equivalent inertial mass category being determined when operated on a level road under balanced wind conditions at a true speed of 65 + or − 2 k.p.h. (40.4 + or − 1.2 m.p.h.); and

(B) Note the dynamometer indicated road load power setting required to reproduce that force when the same vehicle is operated on the dynamometer at a true speed of 65 + or − 1 k.p.h. (40.4 + or − 0.6 m.p.h.); or

(ii) (A) Measure the time required for a representative vehicle and rider of the same equivalent inertial mass category being determined to freely coast from 70 k.p.h. (43.5 m.p.h.) down to 60 k.p.h. (37.3 m.p.h.) when operated on a level road under balanced wind conditions. This measurement should be repeated 10 times in immediate succession, 5 in each of the opposing road directions. The aver-

age time is then calculated from these measurements; and

(B) Note the dynamometer indicated road load power setting required to reproduce that average 70 k.p.h. (43.5 m.p.h.) to 60 k.p.h. (37.3 m.p.h.) coast down time when the same vehicle is allowed to freely coast on the dynamometer. The same equivalent inertial mass used in § 85.478–15(e)(2)(ii)(a) shall be set on the dynamometer.

(iii) For either § 85.478–15(e)(2)(i) or (ii) or any other procedure approved in advance by the Administrator, the tests on the road and on the dynamometer shall be performed with the same vehicle ambient absolute pressure (usually barometric), i.e. within + or — 1.33 kPa (+ or — 10 mm Hg); and the same vehicle ambient temperature, i.e. within + or — 5°C (+ or —9°F).

(iv) The road load power shall be determined according to the procedure outlined in Appendix II.

(f) The vehicle speed (k.p.h.) as measured from the dynamometer roll(s) shall be used for all conditions. A speed vs. time recording, as evidence of dynamometer test validity, shall be supplied on request of the Administrator.

(g) Practice runs over the prescribed driving schedule may be performed at test points, provided an emission sample is not taken, for the purpose of finding the minimum throttle action to maintain the proper speed-time relationship, or to permit sampling system adjustments to comply with § 85.478–20(b)(2).

(h) The drive wheel tire(s) may be inflated up to 300 kPa (43.5 psig) in order to prevent tire damage. The drive wheel tire pressure shall be reported with the test results.

(i) If the dynamometer has not been operated during the 2 hour period immediately preceding the test it shall be warmed up for 15 minutes by operating it at 50 k.p.h. (31.1 m.p.h.) using a non-test vehicle.

(j) If the dynamometer power setting must be adjusted manually, it shall be set within 1 hour prior to the exhaust emissions test phase. The test vehicle shall not be used to make this adjustment. Dynamometers using automatic control of preselectable power settings may be set any time prior to the beginning of the emissions test.

(k) The driving distance, as measured by counting the number of dynamometer roll revolutions, shall be determined for the transient cold start, stabilized cold start, and transient hot start phases of the test.

§ 85.478–16 Manual transmissions.

(a) Vehicles equipped with transfer cases, multiple sprockets, etc., shall be tested in the manufacturer's recommended configuration for street or highway use. If more than one configuration is recommended or if the recommendation is deemed unreasonable by the Administrator, the Administrator will specify the test configuration.

(b) Idle modes shall be run with transmission in gear and with clutch disengaged (except first idle; see § 85.478–19).

(c) The vehicle shall be driven with minimum throttle movement to maintain the desired speed. No simultaneous use of brake and throttle shall be permitted.

(d) Acceleration modes shall be driven smoothly with the shift speeds as recommended in the manufacturer's operating instructions or owner's manual unless the recommendation is deemed unreasonable by the Administrator.

(1) If the manufacturer does not recommend shift speeds, the vehicle shall be shifted as specified in the following table for vehicles with engine displacements equal to or greater than 170 cc (10.4 cu. in.).

Shift	Speed
First to second gear	30 k.p.h. (18.6 m.p.h.)
Second to third gear	34 k.p.h. (28.0 m.p.h.)
Third to fourth gear	60 k.p.h. (37.3 m.p.h.)
Fourth to fifth gear	75 k.p.h. (46.6 m.p.h.)

(2) If the manufacturer does not recommend shift speeds, the vehicle shall be shifted as specified in the following table for vehicles with engine displacements less than 170 cc (10.4 cu. in.).

Shift	Speed
First to second gear	19 k.p.h. (11.8 m.p.h.)
Second to third gear	33 k.p.h. (20.5 m.p.h.)
Third to fourth gear	44 k.p.h. (27.8 m.p.h.)
Fourth to fifth gear	53 k.p.h. (32.9 m.p.h.)

(3) Sixth gear may be used at the manufacturer's option.

(e) The operator shall release the throttle during the shift, disengage the clutch, and accomplish the shift with minimum time. If the vehicle cannot accelerate at the specified rates, the vehicle shall be accelerated at maximum available power until the vehicle speed reaches the speed at which it should be at that time during the test.

(f) The deceleration modes shall be run with clutch engaged and without shifting gears from the previous mode, using brakes or throttle as necessary to maintain the desired speed. For those modes which decelerate to zero, the clutch shall be disengaged when the speed drops below 30 k.p.h. (18.6 m.p.h.) for vehicles with engine displacements equal to or greater than 170 cc (10.4 cu. in.), when the speed drops below 19 k.p.h. (11.8 m.p.h.) for vehicles with engine displacements less than 170 cc (10.4 cu. in.), when engine roughness is evident, or when engine stalling is imminent.

(g) Downshifting is allowed at the beginning of or during a power mode if recommended by the manufacturer or if the engine obviously is lugging.

§ 85.478–17 [Reserved]

§ 85.478–18 Automatic transmissions.

(a) All tests shall be conducted with the transmission in "Drive" (highest gear). Automatic clutch-torque converter transmissions may be shifted as manual transmissions at the option of the manufacturer.

(b) Idle modes shall be run with the transmission in "Drive" and the wheel(s) braked (except first idle; see § 85.478–19).

(c) The vehicle shall be driven with minimum throttle movement to maintain the desired speed. No simultaneous use of brake and throttle shall be permitted.

(d) Acceleration modes shall be driven smoothly allowing the transmission to shift automatically through the normal sequence of gears. If the vehicle cannot accelerate at the specified rates, the vehicle shall be accelerated at maximum available power until the vehicle speed reaches the speed at which it should be at that time during the driving schedule.

(e) The deceleration modes shall be run in gear using brakes or throttle as necessary to maintain the desired speed.

§ 85.478–19 Engine starting and restarting.

(a) The engine shall be started according to the manufacturer's recommended starting procedures. The initial 20 second idle period shall begin when the engine starts.

(b) *Choke operation:* (1) Vehicles equiped with automatic chokes shall be operated according to the instructions which will be included in the manufacturer's operating instructions or owner's manual including choke setting and "kick-down" from cold fast idle. The transmission shall be placed in gear 15 seconds after the engine is started. If necessary, braking may be employed to keep the drive wheel(s) from turning.

(2) Vehicles equipped with manual chokes shall be operated according to the instructions which will be included in the manufacturer's operating instructions or owner's manual.

(c) The operator may use the choke, throttle, etc., where necessary to keep the engine running.

(d) If the manufacturer's operating instructions or owner's manual does not specify a warm engine starting procedure, the engine (automatic and manual choke engines) shall be started by opening the throttle about half way and cranking the engine until it starts.

(e)(1) If the vehicle does not start after 10 seconds of cranking, or ten cycles of the manual starting mechanism, during the cold start, cranking shall cease and the reason for failure to start determined in accordance with § 85.478–6. The revolution counter on the constant volume sampler (see § 85.478–24 Dynamometer test runs) shall be turned off and the sample solenoid valves placed in the "dump" position during this diagnostic period. In addition, either the positive displacement pump should be turned off or the exhaust tube(s) disconnected from the tailpipe(s) during the diagnostic period. If failure to start is an operational error, the vehicle shall be rescheduled for testing from a cold start. If failure to start is caused by vehicle malfunction, corrective action of less than 30 minutes duration may be taken and the test continued. The sampling system shall be reactivated at the same time cranking is started. When the engine starts, the driving schedule timing sequence shall begin. If failure to start is caused by vehicle malfunction and the vehicle cannot be started, the test shall be voided, the vehicle removed from the dynamometer, corrective

action taken in accordance with § 85.478–6, and the vehicle rescheduled for test. The reason for the malfunction (if determined) and the corrective action taken shall be reported.

(2) If the vehicle does not start after 10 seconds of cranking, or ten cycles of the manual starting mechanism, during the hot start, cranking shall cease, the test shall be voided, the vehicle removed from the dynamometer, corrective action taken in accordance with § 85.478–6, and the vehicle rescheduled for test. The reason for the malfunction (if determined) and the corrective action taken shall be reported.

(f) If the engine "false starts", the operator shall repeat the recommended starting procedure (such as resetting the choke, etc.).

(g) *Stalling:* (1) If the engine stalls during an idle period, the engine shall be restarted immediately and the test continued. If the engine cannot be started soon enough to allow the vehicle to follow the next acceleration as prescribed, the driving schedule indicator shall be stopped. When the vehicle restarts the driving schedule indicator shall be reactivated.

(2) If the engine stalls during some operating mode other than idle, the driving schedule indicator shall be stopped, the vehicle restarted, accelerated to the speed required at that point in the driving schedule and the test continued.

(3) If the vehicle will not restart within 1 minute, the test shall be voided, the vehicle removed from the dynamometer, corrective action taken in accordance with § 85.478–6, and the vehicle rescheduled for test. The reason for the malfunction (if determined) and the corrective action taken shall be reported.

§ 85.478–20 Sampling and analytical system (exhaust emissions).

(a) *Schematic drawings.* The following figures (Figures E 478–1 and E 478–2) are schematic drawings of the exhaust gas sampling and analytical systems which will be used for testing under the regulations in this part. Since various configurations of the required components can produce accurate results, these schematic drawings are not to be interpreted literally and exact conformance is not mandatory. Additional components such as instruments, valves, solenoids, pumps, and switches may be used to provide additional information and coordinate the functions of the component systems.

(b) *Component description (exhaust gas sampling system).* The following components will be used in the exhaust gas sampling system for testing under the regulations in this subpart. See Figure E 478–1. Other types of constant volume samplers may be used if shown to yield equivalent results and if approved in advance by the Administrator.

(1) A dilution air filter assembly consisting of a particulate (paper) filter to remove solid matter from the dilution air and thus increase the life of the charcoal filter; a charcoal filter to reduce and stabilize the background hydrocarbon level; and a second particulate filter to remove charcoal particles from the air stream.

(2) A leak-tight connector(s) and tube(s) to the vehicle tailpipe(s). The tubing shall be sized and connected in such a maner that the static pressure variations in the vehicle tailpipe(s) remain within + or − 1.25 kPa (+ or − 5.02 in. H20) of the static pressure variations measured during a dynamometer driving cycle with no connection to the tailpipe(s). Sampling systems capable of tolerances to + or − 0.25 kPa (+ or − 1.00 in. H20) will be used by the Administrator if a written request by the manufacturer substantiates the need for this closer tolerance.

(3) A heating system to preheat the heat exchanger to within + or − 5°C (+ or − 9°F) of its operating temperature before the test begins.

(4) A heat exchanger capable of limiting the gas mixture temperature variation during the entire test to + or − 5°C (+ or − 9°F) as measured at a point immediately ahead of the positive displacement pump.

(5) A positive displacement pump to pump the dilute exhaust mixture. The pump capacity (0.14 m^3/s (300 cfm) to 0.17 m^3/s (350 cfm) is sufficient for testing most vehicles) shall be large enough to virtually eliminate water condensation in the system. See Appendix III for one flow calibration technique. Other suitable calibration techniques may be used if approved in advance by the Administrator.

(6) Temperature sensor (T1) with an accuracy of + or − 1°C (+ or − 1.8° F) to allow continuous recording of the temperature of the dilute exhaust mixture entering the positive displacement pump. (See § 85.478–22(1).)

(7) Gauge (G1) with an accuracy of + or − 400 Pa (+ or − 3mm Hg) to measure the pressure depression of the dilute exhaust mixture entering the positive displacement pump, relative to atmospheric pressure.

(8) Gauge (G2) with an accuracy of + or − 400 Pa (+ or − 3 mm Hg) to measure the pressure increase across the positive displacement pump.

(9) Sample probes (S1 and S2) pointed upstream to collect samples from the dilution air stream and the dilute exhaust mixture.

(10) Filters (F1 and F2) to remove particulate matter from dilution air and dilute exhaust samples.

(11) Pumps (P1 and P2) to pump the dilution air and dilute exhaust into their respective sample collection bags.

(12) Flow control valves (N1 and N2) to regulate flows to sample collection bags, at constant flow rates. The minimum sample flow rate shall be 89 cm^3/s (10.2 ft^3/hr).

(13) Flowmeters (FL1 and FL2) to insure, by visual observation, that constant flow rates are maintained throughout the test.

(14) Three-way solenoid valves (V1, V2, V3, and V4) to direct sample streams to either their respective bags or overboard.

(15) Quick-connect, leak-tight fittings (C1, C2, C3, and C4) with automatic shutoff on bag side to attach sample bags to sample system.

(16) Sample collection bags for dilution air and exhaust samples of sufficient capacity so as not to impede sample flow.

(17) Revolution counters to count the revolutions of the positive displacement pump while each test phase is in progress and samples are being collected.

(c) *Component description (exhaust gas analytical system).* The following components will be used in the exhaust gas analytical system for testing under the regulations in this part. The analytical system provides for the determination of hydrocarbon concentrations by flame ionization detector (FID) analysis, the determination of carbon monoxide and carbon dioxide concentrations by nondispersive infrared (NDIR) analysis and the determination of oxides of nitrogen concentrations by chemiluminescence (CL) analysis in dilute exhaust samples. The chemiluminescence method of analysis requires that the nitrogen dioxide present in the sample be converted to nitric oxide before analysis. Other types of analyzers may be used if shown to yield equivalent results and if approved in advance by the Administrator. See Figure E 478–2.

(1) Quick-connect, leak-tight fitting (C5) to attach sample bags to analytical system.

(2) Filter (F3) to remove any residual particulate matter from the collected sample.

(3) Pump (P3) to transfer samples from the sample bags to the analyzers.

(4) Selector valves (V5, V6, V7, V8, V9, V10, V11, and V12) for directing samples, span gases, or zeroing gases to the analyzers.

(5) Flow control valves (N3, N4, N5, N6, N7, N8, N9, N10, N11, N12, N13, N14, and N15) to regulate the gas flow rates.

(6) Flowmeters (FL3, FL4, FL5, FL6, and FL7) to indicate gas flow rates.

(7) Pressure gauges (G3 and G4) to facilitate greater precision in setting and reading flowrates.

(8) Manifold (M1) to collect the expelled gases from the analyzers.

(9) Pump (P4) to transfer expelled gases from the collection manifold to a vent external to the test room (optional).

(10) Analyzers to determine hydrocarbon, carbon monoxide, carbon dioxide, and oxides of nitrogen concentrations. See § 85.478–23(a).

(11) Sample conditioning column containing CaSO4 or indicating silica gel to remove water vapor and containing ascarite to remove carbon dioxide from the CO analysis stream.

NOTE.—If CO instruments which are essentially free of CO2 and water vapor interference are used, the use of the conditioning column may be deleted. See §§ 85.478–22(n) and 85.478–26(c). A CO instrument will be considered to be essentially free of CO2 and water vapor interference if its response to a mixture of 3 percent CO2 in N2, which has been bubbled through water at room tem-

perature (20°–30°C (68°–86°F)), produces an equivalent CO response, as measured on the most sensitive CO range, which is less than 1 percent of full scale CO concentration on instrument ranges above 300 ppm CO or less than 3 ppm on instrument ranges below 300 ppm CO.

(12) Recorders (R1, R2, R3, and R4) or digital printers to provide permanent records of calibration, spanning, and sample measurements; or in those facilities where computerized data acquisition systems are incorporated, the computer facility printout may be used.

§ 85.478–21 [Reserved]

§ 85.478–22 Information to be recorded.

The following information shall be recorded with respect to each test:

(a) Test number.

(b) System or device tested (brief description).

(c) Date and time of day for each part of the test schedule.

(d) Instrument operator.

(e) Rider or operator.

(f) Vehicle: Make, Vehicle identification number, Year of production, Transmission type, Odometer reading, Engine displacement, Engine family, Idle RPM, Nominal fuel tank capacity, Inertial loading, Actual curb mass recorded at 0 kilometers, Actual road load power at 65 k.p.h. (40.4 m.p.h.) and drive wheel tire pressure.

(g) Indicated road load power absorption at 65 k.p.h. (40.4 m.p.h.) and dynamometer serial number. As an alternative to recording the dynamometer serial number, a reference to a vehicle test cell number may be used, with the advance approval of the Administrator: Provided, That the test cell records show the pertinent information.

(h) All pertinent instrument information such as tuning—gain—serial number—detector number—range. As an alternative, a reference to a vehicle test cell number may be used, with the advance approval of the Administrator: *Provided*, That the test cell calibration records show the pertinent instrument information.

(i) *Recorder charts:* Identify zero, span, exhaust gas, and dilution air sample traces.

(j) Test cell barometric pressure, ambient temperature, and humidity.

NOTE.—A central laboratory barometer may be used: Provided, That individual test cell barometric pressures are shown to be within + or — 0.1 percent of the barometric pressure at the central barometer location.

(k) *Fuel temperature, as prescribed.*

(l) Pressure of the mixture of exhaust and dilution air entering the positive displacement pump, the pressure increase across the pump, and the temperature set point of the temperature control system. The sample temperature at the inlet to the pump may be measured, if desired, to verify that the temperature variations are within + or — 2°C (+ or — 3.6°F) of the set point.

(m) The number of revolutions of the positive displacement pump accumulated while the test is in progress and exhaust flow samples are being collected.

(n) The humidity of the dilution air. Note: If conditioning columns are not used (see § 85.478–20(c)(11), this measurement can be deleted. If the conditioning columns are used and the dilution air is taken from the test cell, the ambient humidity can be used for this measurement.

(o) The driving distance for each of the three phases of the test, calculated from the measured roll revolutions.

§ 85.478–23 Analytical system calibration and sample handling.

(a) Calibrate the analytical assembly at least once every 30 days. Use the same flow rate as when analyzing samples.

(1) Adjust analyzers to optimize performance.

(2) Zero the hydrocarbon analyzer with zero grade air and the carbon monoxide, carbon dioxide, and oxides of nitrogen analyzers with zero grade air or zero grade nitrogen. The allowable zero gas impurity concentrations should not exceed 1 ppm equivalent carbon response, 1 ppm carbon monoxide, 400 ppm (0.04 mole percent) carbon dioxide, and 0.1 ppm nitric oxide.

(3) Set the CO and CO2 analyzer gains to give the desired range. Select the desired attenuation scale of the HC analyzer, set the capillary flow rate by adjusting the back pressure regulator, and adjust the electronic gain control, if provided, to give the desired range. Select the desired scale of the NOx analyzer and adjust the phototube high voltage supply or amplifier gain to give the desired range.

(4) Calibrate the HC analyzer with propane (air diluent) gases having nominal concentrations equal to 50 and 100 percent of full scale. Calibrate the CO analyzer with carbon monoxide (nitrogen diluent) gases and the CO2 analyzer with carbon dioxide (nitrogen diluent) gases having nominal concentrations equal to 10, 25, 40, 50, 60, 70, 85, and 100 percent of full scale. Calibrate the NOx analyzer with nitric oxide (nitrogen diluent) gases having nominal concentrations equal to 50 and 100 percent of full scale. The actual concentrations should be known to within + or — 2 percent of the true values.

(5) Compare values obtained on the CO and CO2 analyzers with previous calibration curves. Any significant change reflects some problem in the system. Locate and correct the problem, and recalibrate. Use best judgment in selecting curves for data reduction.

(6) NOx converter efficiency determination: The apparatus described and illustrated in Figure E 478–7 or Figure E 478–8 is to be used to determine the conversion efficiency of devices that convert NOx to NO.

The following procedure is to be used for determining the values to be used in Equation (A).

(i) Attach the NO/N2 supply (150–250 ppm) at C2, the O2 supply at C1 and the analyzer inlet connection to the efficiency detector at C3. If lower concentrations of NO are used, air may be used in place of O2 to facilitate better control of the NO2 generated during step (iv).

(ii) With the efficiency detector variac off, place the NOx converter in bypass mode and close valve V3. Open valve MV2 until sufficient flow and stable readings are obtained at the analyzer. Zero and span the analyzer output to indicate the value of the NO concentration being used. Record this concentration.

(iii) Open valve V3 (on/off flow control solenoid valve for O2) and adjust valve MV1 (O2 supply metering valve) to blend enough O2 to lower the NO concentration (ii) about 10 percent. Record this concentration.

(iv) Turn on the ozonator and increase its supply voltage until the NO concentration of (iii) is reduced to about 20 percent of (ii). NO2 is now being formed from the NO+O2 reaction. There must always be at least 10 percent unreacted NO at this point. Record this concentration.

(v) When a stable reading has been obtained from (iv), place the NOx converter in the convert mode. The analyzer will now indicate the total NOx concentration. Record this concentration.

(vi) Turn off the ozonator and allow the analyzer reading to stabilize. The mixture NO+O2 is still passing through the converter. This reading is the total NOx concentration of the dilute NO span gas used at step (iii). Record this concentration.

(vii) Close valve V3. The NO concentration should be equal to or greater than the reading of (ii) indicating whether the NO contains any NO2.

Calculate the efficiency of the NOx converter by substituting the concentrations obtained during the test into equation (A).

$$\text{Percent efficiency} = [(v-(iv))/((vi)-(iv))] \times 100 \text{ percent}$$

The efficiency of the converter should be greater than 90 percent. Adjusting the converter temperature may be needed to maximize the efficiency. Efficiency checks should be made on each analyzer range using an NO span gas concentration appropriate to the instrument range. See alternate procedure in paragraph (a)(6)(viii).

(viii) Alternative to paragraph (a)(6)(vii): Close valve V3. The NO concentration should be equal to or greater than the reading of (ii) indicating whether the NO contains any NO2.

Calculate the efficiency of the NO converter by substituting the concentrations obtained during the test into Equation (A).

$$\text{Percent efficiency} = [1+(v-vi)/(iii-iv)] \times 100 \text{ percent} \quad (A)$$

The efficiency of the converter should be greater than 90 percent. Adjusting the converter temperature may be needed to maximize the efficiency. Although steps (ii) and (vii) are not used in the calculations, their values should be recorded to complete the data set for the test sequence. This procedure does not depend on the amount of NO2 in the span gas nor the equivalence of flows in the bypass and converter modes; how-

ever, to be consistent with good operating practice, flows should be nominally the same, and the NO2 concentration should be less than 5 percent of the NOx span concentration. Efficiency checks should be made at a frequency (daily to weekly) consistent with good quality assurance provisions.

(7) Check the efficiency of the sample conditioning system, if used, by the following procedure:

(i) Zero and span the CO instrument on its most sensitive scale.

(ii) Recheck zero.

(iii) Bubble a mixture of 3 percent CO2 in N2 through water at room temperature (20°–30°C (68°–86°F)), through the conditioning column into the CO instrument. If the response meets the criteria of § 85.478–20(c)(11), then the conditioning column is functioning acceptably. If the response is higher than the specified limit, a new conditioning column should be installed and the test repeated.

(iv) Sample conditioning systems should be checked at a frequency consistent with observed column life or when the indicator of the column packing begins to show deterioration.

(b) HC, CO, CO2, and NOx measurements: Allow a minimum of 20 minutes warm-up for the HC analyzer and 2 hours for the CO, CO2, and NOx analyzers. Power is normally left on for infrared and chemiluminescence analyzers; but when not in use, the chopper motors of the infrared analyzers are turned off and the phototube high voltage supply of the chemiluminescence analyzer is placed in the standby position.) The following sequence of operations should be performed in conjunction with each series of measurements:

(1) Zero the analyzers. Obtain a stable zero on each amplifier meter and recorder. Recheck after tests.

(2) Introduce span gases and set the CO and CO2 analyzer gains, the HC analyzer sample capillary flow rate and the NOx analyzer high voltage supply or amplifier gain to match the calibration curves. In order to avoid corrections, span and calibrate at the same flow rates used to analyze the test samples. Span gases should have concentrations equal to approximately 80 percent of full scale. If gain has shifted significantly on the CO or CO2 analyzers, check tuning. If necessary, check calibration. Recheck after test. Show actual concentrations on chart or computer printout.

(3) Check zeros; repeat the procedure in paragraphs (b) (1) and (2) of this paragraph if required.

(4) Check flow rates and pressures.

(5) Measure HC, CO, CO2, and NOx concentrations of samples. Care should be exercised to prevent moisture from condensing in the sample collection bag.

(6) Check zero and span points.

(c) For the purposes of this section, the term "zero grade air" includes artificial "air" consisting of a blend of nitrogen and oxygen with oxygen concentrations between 18 and 21 mole percent.

§ 85.478–24 Dynamometer test runs.

(a) The vehicle shall be allowed to stand with the engine turned off for a period of not less than 12 hours before the cold start exhaust emission test at an ambient temperature range between 20° and 30° C (68° and 86° F). The vehicle shall be stored prior to the emission tests in such a manner that precipitation (e.g. rain or dew) does not occur on the vehicle. For vehicles with engine displacements equal to or greater than 170 cc (10.4 cu. in.), the complete dynamometer test consists of a cold start drive of 12.0 km (7.5 mi) and simulates a hot start drive of 12.0 km (7.5 mi). For vehicles with engine displacements less than 170 cc (10.4 cu. in.), the complete dynamometer test consists of a cold start drive of 10.9 km (6.8 mi) and simulates a hot start drive of 10.9 km (6.8 mi). The vehicle is allowed to stand on the dynamometer during the 10 minute time period between the cold and hot start tests. The cold start test is divided into two periods. The first period, representing the cold start "transient" phase, terminates at the end of the deceleration which is scheduled to occur at 505 seconds of the driving schedule. The second period, representing the "stabilized" phase, consists of the remainder of the driving schedule including engine shutdown. The hot start test similarly consists of two periods. The first period, representing the hot start "transient" phase, terminates at the same point in the driving schedule as the first phase of the cold start test. The second period of the hot start test, the "stabilized" phase, is assumed to be identical to the second period of the cold start test. Therefore, the hot start test terminates after the first period (505 seconds) is run. During the tests the ambient temperature shall be between 20° and 30° C (68° and 86° F).

(b) The following steps shall be taken for each test:

(1) Place the drive wheel(s) of the vehicle on the dynamometer without starting the engine.

(2) Start the vehicle cooling fan.

(3) With the sample solenoid valves in the "dump" position connect the evacuated sample collection bags to the two dilute exhaust sample connectors and to the two dilution air sample line connectors.

(4) Start the positive displacement pump (if not already on), the sample pumps, and the temperature recorder. (The heat exchanger of the constant volume sampler should be preheated to its operating temperature before the test begins.)

(5) Adjust the sample flow rates to the desired flow rate (minimum of 80 cm^3/s (10.2 ft^3/hr)) and set the revolution counters to zero.

(6) Attach the flexible exhaust tube(s) to the vehicle tailpipe(s).

(7) Simultaneously start the revolution counter for the positive displacement pump, position the sample solenoid valves to direct the sample flow into the "transient" exhaust sample bag and the "transient" dilution air sample bag, and start cranking the engine.

(8) Fifteen seconds after the engine starts, place the transmission in gear.

(9) Twenty seconds after the engine starts, begin the initial vehicle acceleration of the driving schedule.

(10) Operate the vehicle according to the dynamometer driving schedule (§ 85.478–14).

(11) At the end of the deceleration which is scheduled to occur at 505 seconds, simultaneously switch the sample flows from the "transient" bags to the "stabilized" bags, switch off revolution counter No. 1 and start No. 2. Before the acceleration which begins at 510 seconds, record the measured roll revolutions and reset the counter, or switch to a second counter. As soon as possible and in no case longer than 20 minutes after the end of this portion of the test disconnect the "transient" exhaust and dilution air sample bags, transfer them to the analytical system and process the samples according to § 85.478–23.

(12) Turn the engine off 2 seconds after the end of the last deceleration (at 1,369 seconds).

(13) Five seconds after the engine stops running, simultaneously turn off revolution counter No. 2 and position the sample solenoid valves to the "dump" position. Record the measured roll revolutions and reset the counter. As soon as possible and in no case longer than 20 minutes after the end of this portion of the test disconnect the "stabilized" exhaust and dilution air sample bags, transfer them to the analytical system and process the samples according to § 85.478–23.

(14) Immediately after the end of the sample period turn off the cooling fan.

(15) Turn off the positive displacement pump or disconnect the exhaust tube(s) from the tailpipe(s) of the vehicle.

(16) Repeat the steps in paragraph (b) (2) through (10) of this section for the hot start test except only one evacuated sample bag is required for sampling exhaust gas and one for dilution air. The step in paragraph (b) (7) of this section shall begin between 9 and 11 minutes after the end of the sample period for the cold start test.

(17) At the end of the deceleration which is scheduled to occur at 505 seconds, simultaneously turn off the No. 1 revolution counter and position the sample solenoid valve to the "dump" position. (Engine shutdown is not part of the hot start test sample period.) Record the measured roll revolutions.

(18) As soon as possible and in no case longer than 20 minutes after the end of this portion of the test disconnect the hot start "transient" exhaust and dilution air sample bags, transfer them to the analytical system and process the samples according to § 85.478–23.

(19) Disconnect the exhaust tube(s) from the vehicle tailpipe(s) and remove the vehicle from the dynamometer.

(20) The positive displacement pump may be turned off, if desired.

§ 85.478–25 Chart reading.

(a) Determine the HC, CO, CO2, and NOx concentrations of the dilution air and dilute exhaust sample bags from the instrument deflections or recordings making use of appropriate calibration charts or computer storage files.

(b) Determine the average dilute exhaust mixture temperatures from the temperature recorded trace if a recorder is used.

§ 85.478–26 Calculations (exhaust emissions).

The final reported test results shall be computed by use of the following formulae:

(a)

Ywm=0.43[Yct+Ys)/(Dct+Ds)]+0.57[(Yht+YS)/(Dht+Ds)]

where:

Ywm=Weighted massemissions of each pollutant, i.e., HC, CO, or NOx, in grams per vehicle kilometer.

Yct=Mass emissions as calculated from the "transient" phase of the cold start test, in grams per test phase.

Yht=Mass emissions as calculated from the "transient" phase of the hot start test, in grams per test phase.

Ys=Mass emissions as calculated from the "stabilized" phase of the cold start test, in grams per test phase.

Dct=The measured driving distance from the "transient" phase of the cold start test, in kilometers.

Dht=The measured driving distance from the "transient" phase of the hot start test, in kilometers.

Ds=The measured driving distance from the "stabilized" phase of the cold start test, in kilometers.

(b) The mass of each pollutant for each phase of both the cold start test and the hot start test is determined from the following:

(1) Hydrocarbon mass:

HCmass=Vmix × DensityHC × (HCconc/1,000,000)

(2) Oxides of nitrogen mass:

NOxmass=Vmix × DensityNO2 × (NOxconc × Kh/1,000,000)

(3) Carbon monoxide mass:

1,000,000)

COmass=Vmix×DensityCO×(COconc/equivalent propane×3.

(4) Carbon dioxide mass:

CO2mass=Vmix × DensityCO2 × (CO2 conc/100)

(c) Meaning of symbols:

HCmass=Hydrocarbon emissions, in grams per test phase.

DensityHC=Density of hydrocarbon in the exhaust gas, assuming an average carbon to hydrogen ratio of 1:1.85, in kilograms per cubic meter at 20° C (68° F) and 101.325 kPa (760 mm Hg) pressure (0.5767 kg/m³ (16.33 g/ft³)).

HCconc=Hydrocarbon concentration of the dilute exhaust sample corrected for background, in ppm carbon equivalent, i.e., equivalent propane ×3.

HCconc=HCe—HCd(1–1/DF)

where:

HCe=Hydrocarbon concentrations of the dilute exhaust sample as measured, in ppm carbon equivalent.

HCd=Hydrocarbon concentration of the dilution air as measured, in ppm carbon equivalent.

NOxmass=oxides of nitrogen emissions, in grams per test phase.

Density NO2=Density of oxides of nitrogen in the exhaust gas, assuming they are in the form of nitrogen dioxide, in kilograms per cubic meter at 20° C (68° F) and 101.325 kPa (760 mm Hg) pressure (1.913 kg/m³ (54.16 g/ft³)).

NOxconc=Oxides of nitrogen concentration of the dilute exhaust sample corrected for background, in ppm.

NOxconc=NOxe—NOxd (1–1/DF)

where:

NOxe=Oxides of nitrogen concentration of the dilute exhaust sample as measured, in ppm.

NOxd=Oxides of nitrogen concentration of the dilution air as measured, in ppm.

COmass=Carbon monoxide emissions, in grams per test phase.

Density CO=Density of carbon monoxide in kilograms per cubic meter at 20° C (68° F) and 101.325 kPa (760 mm Hg) pressure (1.164 kg/m³ (32.97 g/ft³)).

COconc=Carbon monoxide concentration of the dilute exhaust sample corrected for background, water vapor, and CO2 extraction, in ppm.

COconc=COe—COd (1–1/DF) where:

COe=Carbon monoxide concentration of the dilute exhaust sample volume corrected for water vapor and carbon dioxide extraction, in ppm. The calculation assumes the carbon to hydrogen ratio of the fuel is 1:1.85.

COe=(1–0.01925CO2e—0.000323R)COem

where:

COem=Carbon monoxide concentration of the dilute exhaust sample as measured, in ppm.

CO2e=Carbon dioxide concentration of the dilute exhaust sample, in mole precent.

R=Relative humidity of the dilution air, in percent (see #85.478–22(n)).

COd=Carbon monoxide concentration of the dilution air corrected for water vapor extraction, in ppm.

COd=(1–0.000323R) COdm

where:

COdm=Carbon monoxide concentration of the dilution air sample as measured, in ppm.

NOTE: If a CO instrument which meets the criteria specified in § 85.478–20(c)(11) is used and the conditioning column has been deleted, COem can be substituted directly for COe and COdm can be substituted directly for COd.

CO2mass=Carbon dioxide emissions, in grams per test phase.

DensityCO2=Density of carbon dioxide in kilograms per cubic meter at 20° C (68° F) and 101.325 kPa (760 mm Hg) pressure (1.843 kg/m³ (52.20 g/ft³)).

CO2conc=Carbon dioxide concentration of the dilute exhaust sample corrected for background, in percent.

CO2conc=CO2e—CO2d (1–1/DF) 10^{-4}

where:

CO2d=Carbon dioxide concentration of the dilution air as measured, in ppm.

DF=13.4/[CO2e+(HCe+COe) 10^{-4}]

Vmix=Total dilute exhaust volume in cubic meters per test phase corrected to standard conditions (293.15° K (528° R) and 101.325 kPa (760 mm Hg)).

Vmix=Vo×N[(Pb—Pi) (293.15° K)]/[(101.325 kPa) (Tp)]

where:

Vo=Volume of gas pumped by the positive displacement pump, in cubic meters per revolution. This volume is dependent on the pressure differential across the positive displacement pump. (See calibration techniques in Appendix III.)

N=Number of revolutions of the positive displacement pump during the test phase while samples are being collected.

Pb=Barometric pressure in kPa.

Pi=Pressure depression below atmospheric measured at the inlet to the positive displacement pump.

Tp=Average temperature of dilute exhaust entering positive displacement pump during test while samples are being collected, in degrees Kelvin.

Kh=Humidity correction factor.

Kh=1/[1–0.083(H–10.7)]

where:

H=Absolute humidity in grams of water per kilogram of dry air.

H=[(6.2066)Ra×Pd]/[Pb—(Pd×Ra/100)]

Ra=Relative humidity of the ambient air, in percent.

Pd=Saturated vapor pressure, in kPa at the ambient dry bulb temperature.

(d) Example calculation of mass emission values for vehicles with engine displacements equal to or greater than 170 cc (10.4 cu. in.):

(1) For the "transient" phase of the cold start test assume Vo=0.0083093 m³ per revolution; N=10,485; R=48.0 percent; Ra=48.2 percent; Pb=101.6 kPa; Pd=2.963 kPa; Pi=9.332 kPa; Tp=316.7° K; HCe=105.8 ppm carbon equivalent; NOxe=11.2 ppm; COem=306.6 ppm; CO2e=0.73 percent; HCd=12.1 ppm; NOxd=0.8 ppm; COdm=15.3 ppm; CO2d=315 ppm; Dct=5.781 km. Then:

Vmix=[(0.0083093) (10,485) (101.6–9.332) (293.15)]/[(101.325) (316.7)]

Vmix=73.436 m³ per test phase.

H=[(6.2066) (48.2) (2.963)]/[(101.6)–(2.963) (48.2/100)]

H=8.85 grams H2O per kg dry air.

Kh=1/[1–0.033(8.85—10.7)]

Kh=0.9425

COe=[1–0.01925(0.73)—0.000323(48)]306.6

COe=297.5 ppm.

COd=[1–0.000323(48)]15.3

COd=15.1 ppm.

DF=13.4/[0.73+(105.8+297.5)10^{-4}

DF=17.40

HCconc=105.8—12.1(1—1/17.40)

HCconc=94.40 ppm.

HCmass=(73.436) (576.7) (94.40) 10^{-6}

HCmass=3.998 grams per test phase

NOxconc=11.2—0.8(1—1/17.40)

NOxconc=10.45 ppm.

NOxmass=(73.436) (1913) (10.45) (0.9425) 10^{-6}

NOxmass=1.384 grams per test phase.

COconc=297.5—15.1(1—1/17.40)

COconc=283.3 ppm.

COmass=(73.436) (1164) (283.3) 10^{-4}

COmass=24.26 grams per test phase.

CO2conc=0.73—315(1—1/17.40) 10^{-4}

CO2conc=0.7003 ppm.

CO2mass=(73.436) (1843) (0.7003) 10^{-2}

CO2mass=947.8 grams per test phase.

(2) For the "stabilized" portion of the cold start test assume that similar calculations resulted in HCmass=0.62 gram per test phase; NOxmass=1.27 grams per test phase; COmass=5.98 grams per test phase; and CO2mass=1178 grams per test phase. Ds=6.207 kilometers.

(3) For the "transient" portion of the hot start test assume that similar calculations resulted in HCmass=0.51 gram per test phase; NOxmass=1.38 grams per test phase; COmass=5.01 grams per test phase; and CO2mass=883.4 grams per test phase. Dht=5.773 kilometers.

(4) For a 1978 motorcycle with an engine displacement equal to or greater than 170cc (10.4 cu. in.):

HCwm=0.43[(3.998+0.62) / (5.781+6.207)]+0.57[(0.51+0.62)/(5.773+6.207)]

HCwm=0.219 gram per vehicle kilometer.
NOxwm=0.43[(1.384+1.27)/(5.781+6.207)]+0.57[(1.38+1.27)/(5.773+6.207)]
NOxwm=0.221 gram per vehicle kilometer.
COwm=0.43[(24.22+5.98)/(5.781+6.207)]+0.57[(5.01+5.98)/(5.773+6.207)]
COwm=1.61 grams per vehicle kilometer.
CO2wm=0.43[(947.8+1178)/(5.781+6.207)]+0.57[(883.4+1178)/(5.773+6.207)]
CO2wm=174 grams per vehicle kilometer.

§ 85.478–27 [Reserved]

§ 85.478–28 Compliance with emission standards.

(a) The applicable exhaust emission standards in #85.478–1 apply to the emissions from vehicles for their useful life.

(b) Since it is expected that emission control efficiency will change with distance accumulation on the vehicle, the emission level of a vehicle which has accumulated 30,000 km (18,641 mi) for vehicles with engine displacements equal to or greater than 170 cc (10.4 cu. in.), or which has accumulated 12,000 km (7,456 mi) for vehicles with engine displacements less than 170 cc (10.4 cu. in.) will be used as the basis for determining compliance with the standards.

(c) The procedure for determining compliance of a new motorcycle with exhaust emission standards is as follows:

(1) Separate emission deterioration factors shall be determined from the emissions results of the durability data vehicles for each engine-system combination. Separate factors shall be established for exhaust BC, exhaust CO, and exhaust NOX.

(i) The applicable results to be used in determining the deterioration factors for each combination shall be:

(A) All valid emission data from the tests required under § 85.478–7(b) except the zero kilometer tests for vehicles with engine displacements equal to or greater than 170 cc (10.4 cu. in.), or except the zero and 1500 kilometer (0 and 932 mi) tests for vehicles with engine displacements less than 170 cc (10.4 cu. in.). This shall include the official test results as determined in § 85.478–29 for all tests conducted or all durability vehicles of the combination selected under § 85.478–5(c) (including all vehicles elected to be operated by the manufacturer under § 85.478–5(c)(2)).

(B) All durability emission data from the tests conducted before and after the scheduled maintenance provided in § 85.478–6(a)(1)(i) and (4)(iii).

(C) All durability emission data from tests required by maintenance approved under § 85.478–6(a)(4)(i), in those cases where the Administrator conditioned his approval for the performance of such maintenance on the inclusion of such data in the deterioration factor calculation.

(ii) All applicable results shall be plotted as a function of the distance on the system, rounded to the nearest kilometer and the best fit straight lines, fitted by the method of least squares, shall be drawn through these data points. For vehicles with engine displacements equal to or greater than 170 cc (10.4 cu. in.) the extrapolated 3500 km (2175 mi) and interpolated 30,000 km (18,641 mi) points on this line must be within the standards provided in § 85.478–1 or the data will not be acceptable for use in calculation of a deterioration factor unless no applicable data point exceeded the standards. For vehicles with engine displacements less than 170 cc (10.4 cu. in.) the extrapolated 2500 km (1553 mi) and interpolated 12,000 km (7456 mi) points on this line must be within the standards provided in § 85.478–1 or the data will not be acceptable for use in calculation of a deterioration factor unless no applicable data point exceeded the standards.

(iii) An exhaust emission deterioration factor shall be calculated for each combination as follows:

For vehicles with engine displacements equal to or greater than 170 cc (10.4 cu. in.):

factor=(exhaust emissions interpolated to 30,000 km) (exhaust emissions extrapolated to 3500 km)

For vehicles with engine displacements less than 170 cc (10.4 cu. in.):

factor=(exhaust emissions interpolated to 12,000 km) (exhaust emissions extrapolated to 2500 km)

These interpolated and extrapolated values shall be carried out to four places to the right of the decimal point before dividing one by the other to determine the deterioration factor. The results shall be rounded to three places to the right of the decimal point in accordance with ASTM E 29–67.

(2) The exhaust emission test results for each emission data vehicle shall be multiplied by the appropriate deterioration factor: Provided, That if a deterioration factor as computed in subparagraph (1)(iii) of this paragraph is less than one, that deterioration factor shall be one for the purposes of this subparagraph.

(3) The emissions to compare with the standard shall be the adjusted emissions of paragraph (c)(2) for each emission data vehicle. Before any emission value is compared with the standard, it shall be rounded, in accordance with ASTM E 29–67, to two significant figures. The rounded emission values shall not exceed the standard.

(4) Every test vehicle of an engine family must comply with all applicable standards, as determined in paragraph (c)(3), before any vehicle of that family may be certified.

§ 85.478–29 Testing by the Administrator.

(a) The Administrator may require that any one or more of the test vehicles be submitted to him, at such place or places as he may designate, for the purpose of conducting emissions tests. The Administrator may specify that he will conduct such testing at the manufacturer's facility, in which case instrumentation and equipment specified by the Administrator shall be made available by the manufacturer for test operations. Any testing conducted at a manufacturer's facility pursuant to this paragraph shall be scheduled by the manufacturer as promptly as possible.

(b)(1) Whenever the Administrator conducts a test on a test vehicle the results of that test, unless subsequently invalidated by the Administrator, shall comprise the official data for the vehicle at that perscribed test point and the manufacturer's data for that prescribed test point shall not be used in determining compliance with emission standards.

(2) Whenever the Administrator does not conduct a test on a test vehicle at a test point, the manufacturer's test data will be accepted as the official data for that test point: Provided, That if the Administrator makes a determination based on testing under paragraph (a) of this section, that there is a lack of correlation between the manufacturer's test equipment and the test equipment used by the Administrator, no manufacturer's test data will be accepted for purposes of certification until the reasons for the lack of correlation are determined and the validity of the data is established by the manufacturer: And further provided, That if the Administrator has reasonable basis to believe that any test data submitted by the manufacturer is not accurate or has been obtained in violation of any provision of this part, the Administrator may refuse to accept that data as the official data pending retesting or submission of further information.

(3)(i) The emission data vehicle presented to the Administrator for testing shall have been calibrated at zero kilometers within the production tolerances applicable to the manufacturer's specifications. If the Administrator determines that a vehicle is not within such tolerances to be shown on the vehicle label (see § 85.478–35(a)(4)(iv)) as specified in the application for certification, the vehicle shall be adjusted at the facility designated by the Administrator prior to the test and an engineering report shall be submitted to the Administrator describing the corrective action taken. Based on the engineering report, the Administrator will determine if the vehicle shall be used as an emission data vehicle.

(ii) If the Administrator determines that the test data developed under paragraph (b)(3)(i) would cause the emission data vehicle to fail due to excessive emissions at the official data vehicle test point (equal to or greater than 170 cc (10.4 cu. in.)—3500 km (2175 mi); less than 170 cc (10.4 cu. in.)—2500 km (1553 mi)) or by application of the appropriate deterioration factor, then the following procedure shall be observed:

(A) The manufacturer may request a retest. Before the retest, the vehicle may be readjusted to manufacturer's specifications, if these adjustments were made incorrectly prior to the first test, and other maintenance or repairs may be performed in accordance with § 85.478–6. All work on the vehicle shall be done at such location and under such conditions as the Administrator may prescribe.

(B) The vehicle will be retested by the Administrator and the results of this test shall comprise the official data for the emission data vehicle.

(4) If sufficient durability data are not available at the time of any emission test conducted under paragraph (a) of this section to enable the Administrator to determine whether an emission data vehicle would fail, the manufacturer may request a retest in accordance with the provisions of paragraphs (b)(3)(ii)(a) and (b) of this section. A request for retest must be made before the manufacturer removes the vehicle from the test premises.

§ 85.478–30 Certification.

(a)(1) If, after a review of the test reports and data submitted by the manufacturer, data derived from any inspection carried out under § 85.406(c), and any other pertinent data or information, the Administrator determines that a test vehicle(s) meets the requirements of the Act and of this subpart, he will issue a certificate of conformity with respect to such vehicle(s) except in cases covered by paragraph (c) of this section.

(2) Such certificate will be issued for such period not to exceed one year of production as the Administrator may determine and upon such terms as he may deem necessary to assure that any new motorcycle covered by the certificate will meet the requirements of the Act and of this subpart. Each such certificate shall contain the following language:

This certificate covers only those new motor cycles which conform, in all material respects, to the design specifications that applied to those vehicles described in the application for certification and which are produced during the — year of production period of the said manufacturer, as defined in 40 CFR 85.402(a)(3).

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 85.406(c) which concern either the vehicle certified, or any production vehicle covered by this certificate, or any production vehicle which when completed will be claimed to be covered by this certificate. Failure to comply with all the requirements of § 85.406(c) with respect to any such vehicle may lead to revocation or suspension of this certificate as specified in 40 CFR 85.478–30(c). It is also a term of this certificate that this certificate may be revoked or suspended for the other reasons stated in § 85.478–30(c).

(3) One such certificate will be issued for each engine-system combination and will certify compliance with no more than one set of applicable standards.

(b)(1) The Administrator will determine whether a vehicle covered by the application complies with applicable standards by observing the following relationships:

(i) A test vehicle selected under § 85.478–5(b) shall represent all vehicles of the same configuration as specified by the Administrator.

(ii) A test vehicle selected under § 85.478–5(c)(1) shall represent all vehicles of the same engine-system combination.

(2) The Administrator will proceed as in paragraph (a) of this section with respect to the vehicles belonging to an engine-system combination all of which comply with one set of applicable standards.

(3) If, after a review of the test reports and data submitted by the manufacturer, data derived from any additional testing conducted pursuant to § 85.478–29, data or information derived from any inspection carried out under § 85.406(c), or any other pertinent data or information, the Administrator determines that one or more test vehicles of the certification test fleet do not meet applicable standards, he will notify the manufacturer in writing, setting forth the basis for his determination. Within 30 days following receipt of the notification, the manufacturer may request a hearing on the Administrator's determination. The request shall be in writing, signed by an authorized representative of the manufacturer and shall include a statement specifying the manufacturer's objections to the Administrator's determination, and data in support of such objections. If, after a review of the request and supporting data, the Administrator finds that the request raises a substantial factual issue, he shall provide the manufacturer a hearing in accordance with § 85.405 with respect to such issue.

(4) The manufacturer may, at his option, proceed with any of the following alternatives with respect to any engine-system combination represented by a test vehicle(s) determined not in compliance with applicable standards:

(i) Request a hearing under § 85.405 or,

(ii) Delete from the application for certification the vehicles represented by the failing test vehicle. (Vehicles so deleted may be included in a later request for certification under § 85.478–32.) The Administrator will then select in place of each failing vehicle an alternate vehicle chosen in accordance with selection criteria employed in selecting the vehicle that failed, or

(iii) Repair the test vehicle and demonstrate by testing that it meets applicable standards. Another vehicle which is in all material respects the same as the first vehicle, as repaired, shall then be operated and tested in accordance with applicable test procedures.

(5) If the manufacturer does not request a hearing or present the required data under subparagraph (4) of this paragraph, the Administrator will deny certification.

(c)(1) Notwithstanding the fact that any certification vehicle(s) may comply with other provisions of this subpart, the Administrator may withhold or deny the issuance of a certificate of conformity (or suspend or revoke any such certificate which has been issued) with respect to any such vehicle(s) if:

(i) The manufacturer submits false or incomplete information in his application for certification thereof; or

(ii) The manufacturer renders inaccurate or invalid any test data which he submits pertaining thereto or otherwise circumvents the intent of the Act or of this subpart with respect to such vehicle; or

(iii) Any EPA Enforcement Officer is denied access on the terms specified in § 85.406(c) to any facility or portion thereof which contains any of the following:

(A) The vehicle, or

(B) Any components used or considered for use in its modification or build up into a certification vehicle, or

(C) Any production vehicle which is or will be claimed by the manufacturer to be covered by the certificate, or

(D) Any step in the construction of a vehicle described in (c) of this subdivision, or

(E) Any records, documents, reports or histories required by this part to be kept concerning any of the above.

(iv) Any EPA Enforcement Officer is denied "reasonable assistance" (as defined in § 85.406(c)) in examining any of the items listed in paragraph (c)(1)(iii) of this section.

(2) The sanctions of withholding, denying, revoking, or suspending of a certificate may be imposed for the reasons in paragraphs (c)(1)(i), (ii), (iii), or (iv) of this section only when the infraction is substantial.

(3) In any case in which a manufacturer knowingly submits false or inaccurate information or knowingly renders inaccurate or invalid any test data or commits any other fraudulent acts and such acts contribute substantially to the Administrator's decision to issue a certificate of conformity, the Administrator may deem such certificate void ab initio.

(4) In any case in which certification of a vehicle is proposed to be withheld, denied, revoked, or suspended under paragraph (c)(1)(iii) or (c)(1)(iv) of this section, and in which the Administrator has presented to the manufacturer involved reasonable evidence that a violation of § 85.406(c) in fact occurred, the manufacturer, if he wishes to contend that, even though the violation occurred, the vehicle in question was not involved in the violation to a degree that would warrant withholding, denial, revocation, or suspension of certification under either paragraph (c)(1)(iii) or (c)(1)(iv) of this section, shall have the burden of establishing that contention to the satisfaction of the Administrator.

(5) Any revocation or suspension of certification under paragraph (c)(1) of this section shall:

(i) Be made only after the manufacturer concerned has been offered an opportunity for a hearing conducted in accordance with § 85.405 hereof.

(ii) Extend no further than to forbid the introduction into commerce of vehicles previously covered by the certification which are still in the hands of the manufacturer, except in cases of such fraud or other misconduct as makes the certification invalid ab initio.

(6) The manufacturer may request in the form and manner specified in paragraph (b)(3) of this section that any determination made by the Administrator under paragraph (c)(1) of this section to withhold or deny certification be reviewed in a hearing conducted in accordance with § 85.405. If the Administrator finds, after a review of the request

and supporting data, that the request raises a substantial factual issue, he will grant the request with respect to such issue.

§ 85.478–31 Separate certification.

Where possible, a manufacturer should include in a single application for certification a description of all vehicles for which certification is required. A manufacturer may, however, choose to apply separately for certification of part of his product line. The selection of test vehicles and the computation of test results will be determined separately for each application.

§ 85.478–32 Addition of a vehicle after certification.

(a) If a manufacturer proposes to add to his product line a vehicle of the same engine-system combination as vehicles previously certified but which was not described in the application for certification when the test vehicle(s) representing other vehicles of that combination was certified, he shall notify the Administrator. Such notification shall be in advance of the addition unless the manufacturer elects to follow the procedure described in § 35.478–34. This notification shall include a full description of the vehicle to be added.

(b) The Administrator may require the manufacturer to perform such tests on the test vehicle(s) representing the vehicle to be added which would have been required if the vehicle had been included in the original application for certification.

(c) If, after a review of the test reports and data submitted by the manufacturer, and data derived from any testing conducted under § 85.478–29, the Administrator determines that the test vehicle(s) meets all applicable standards, the appropriate certificate will be amended accordingly. If the Administrator determines that the test vehicle(s) does not meet applicable standards, he will proceed under § 85.478–30(b).

§ 85.478–33 Changes to a vehicle covered by certification.

(a) The manufacturer shall notify the Administrator of any intended change in production vehicles that would cause such vehicles not to conform to any of the specifications and parameters of Appendix VIIa as described in the appropriate application for certification, giving a full description of the change. Such notification shall constitute a proposed amendment to the application on which certification of the original vehicle was based and shall be in advance of the change unless the manufacturer elects to follow the procedures described in § 85.-478–34.

(b) Based upon the description of the change, and data derived from such testing as the Administrator may require or conduct, the Administrator will determine whether the application for certification may be amended as proposed so that the changed vehicles will be covered by the certificate of conformity then in effect.

(c) If the Administrator determines that such an amendment to the outstanding certificate is justified, he shall notify the manufacturer in writing granting the amendment. Except as provided in § 85.478–34, the change may not be put into effect prior to the manufacturer's receiving this notification. If the Administrafor determines that the modified vehicles will not be covered by the certificate of conformity, he will notify the manufacturer in writing. The manufacturer may then, at his option, proceed with either of the following with respect to the disapproved change:

(1) Request a hearing as provided under § 85.478–30(b)(3); or

(2) In the event the failure can be shown to the satisfaction of the Administrator to be attributable to a vehicle malfunction, repair the test vehicle, and demonstrate by testing that the repaired vehicle meets applicable standards. Another vehicle which conforms in all material respects to the same design specifications that applied to the repaired vehicle, shall then be operated and tested in accordance with applicable test procedures.

§ 85.478–34 Alternative procedure for amending certificates of conformity.

(a) A manufacturer, in lieu of notifying the Administrator in advance of an addition of a vehicle under § 85.478–32 or a change in a vehicle under § 85.478–33, may notify him by appropriate amendment to the application for certification concurrently with the making of the change or addition if the manufacturer determines on the basis of emission data that the addition or change will not adversely affect (cause to increase above the applicable standards) emissions from the affected vehicles. Upon such notification, the manufacturer may proceed to put the addition or change into effect. The applicable certificate of conformity then in effect will be deemed amended as set forth in the amended application unless and until the amendment is rejected by the Administrator under paragraph (c) of this section.

(b) The manufacturer may continue to produce vehicles as described in the amendment to the application for certification for a maximum of 30 days, unless the Administrator grants an extension in writing. This period may be shortened by a notification in accordance with paragraph (c) of this section.

(c) If the Administrator determines, based upon the description of the amendment to the application, that no additional test data will be required, he will notify the manufacturer in writing of the acceptability of the amended application. If the Administrator determines that additional test data will be required, he will so notify the manufacturer and proceed as in § 85–478–32 (b) and (c), or § 85.478–33 (b) and (c) as appropriate.

(d) Election to produce vehicles under this section will be deemed to be a consent to recall all vehicles which the Administrator determines under §§ 85.478–32 or 85.478–33 do not meet applicable standards, and to cause such nonconformity to be remedied at no expense to the owner.

(e) Any changed or added vehicles produced after the manufacturer is notified of the rejected application amendment will not be covered by a certificate of conformity.

§ 85.478–35 Labeling.

(a)(1) The manufacturer of any motorcycle subject to the standards prescribed in § 85.478–1 shall at the time of manufacture, affix a permanent, legible label, of the type and in the manner described below, containing the information hereinafter provided, to all production models of such vehicles available for sale to the public and covered by a certificate of conformity under § 85.478–30(a).

(2) A plastic or metal label shall be welded, riveted, or otherwise permanently attached in a readily visible position on the motorcycle frame.

(3) The label shall be affixed by the vehicle manufacturer, who has been issued the certificate of conformity for such vehicle, in such a manner that it cannot be removed without destroying or defacing the label.

(4) The label shall contain the following information lettered in the English language in block letters and numerals, which shall be of a color that contrasts with the background of the label:

(i) The label heading: Vehicle Emission Control Information;

(ii) Full corporate name and trademark of the manufacturer;

(iii) Engine displacement (in cubic centimeters) and engine family identification;

(iv) Engine tuneup specifications and adjustments, as recommended by the manufacturer, including idle speed, ignition timing, and the idle air-fuel mixture setting procedure and value (e.g. idle CO, idle air-fuel ratio, idle speed drop). These specifications should indicate the proper transmission position during tuneup;

(v) Any specific fuel or engine lubricant requirements (e.g. lead content, Research octane number, engine lubricant type);

(vi) The statement: "This Vehicle Conforms to U.S.E.P.A. Regulations Applicable to 1978 Year of Production New Motorcycles."

(b) The provisions of this section shall not prevent a manufacturer from also reciting on the label that such vehicle conforms to any applicable State emission standards for new motorcycles or any other information that such manufacturer deems necessary for, or useful to, the proper operation and satisfactory maintenance of the vehicle.

§ 85.478–36 Submission of vehicle identification numbers.

(a) The manufacturer of any motorcycle covered by a certificate of conformity under § 85.478–30(a) shall, not later than 60 days after its manufacture, submit to the Administrator the vehicle identification number of such vehicle: Provided, That this requirement

shall not apply with respect to any vehicle manufactured within any State, as defined in section 302(d) of the Act.

(b) The requirements of this section may be waived with respect to any manufacturer who provides information satisfactory to the Administrator which will enable the Administrator to identify those vehicles which are covered by a certificate of conformity.

§ 85.478–37 Production vehicles.

(a) Any manufacturer obtaining certification under this subpart shall supply to the Administrator, upon his request, a reasonable number of production vehicles selected by the Administrator which are representative of the engines, emission control systems, fuel systems, and transmissions offered and typical of production models available for sale under the certificate. These vehicles shall be supplied for testing at such time and place and such reasonable periods as the Administrator may require.

(b) Any manufacturer obtaining certification under this subpart shall notify the Administrator, on a quarterly basis, of the number of vehicles of each engine family-engine displacement-emission control system-fuel system-transmission type-inertial mass category combination produced for sale in the United States during the preceding quarter. A manufacturer may elect to provide this information every 60 days instead of quarterly, to combine it with the notification required under § 85.478–36.

(c) All motorcycles covered by a certificate of conformity under § 85.478–30(a) shall be adjusted by the manufacturer to the ignition timing specification detailed in § 85.478–35(a)(4)(iv).

§ 85.478–38 Maintenance instructions.

(a) The manufacturer shall furnish or cause to be furnished to the ultimate purchaser of each new motorcycle subject to the standards prescribed in § 85.478–1, written instructions for the maintenance and use of the vehicle by the ultimate purchaser as may be reasonable and necessary to assure the proper functioning of emission control systems.

(1) Such instructions shall be provided for those vehicle and engine components listed in Appendix VI to this part (and for any other components) to the extent that maintenance of these components is necessary to assure the proper functioning of emission control systems.

(2) Such instructions shall be in the English language and in clear, and to the extent practical, nontechnical language.

(b) The maintenance instructions required by this section shall contain a general description of the documentation which the manufacturer will require from the ultimate purchaser or any subsequent purchaser as evidence of compliance with the instructions. (Such instructions shall specify the performance of all scheduled maintenance performed by the manufacturer under § 85.478–6(a).)

§ 85.478–39 Submission of maintenance instructions.

(a) The manufacturer shall provide to the Administrator, no later than the time of the submission required by § 85.478–4, a copy of the maintenance instructions which the manufacturer proposes to supply to the ultimate purchaser in accordance with § 85.478–38(a). The Administrator will review such instructions to determine whether they are reasonable and necessary to assure the proper functioning of the vehicle's emission control systems. The Administrator will notify the manufacturer of his determination whether such instructions are reasonable and necessary to assure the proper functioning of the emission control systems.

(b) Any revision to the maintenance instructions which will affect emissions shall be supplied to the Administrator at least 30 days before being supplied to the ultimate purchaser unless the Administrator consents to a lesser period of time.

§ 85.479–1 Emission standards for 1979 year of production vehicles.

The standards and test procedures set forth in § 85.478 remain applicable for the 1979 year of production.

§ 85.480–1 Emission standards for 1980 years of production vehicles.

With the exception of the hydrocarbons, carbon monoxide, and oxides of nitrogen exhaust emission standards, the standards and test procedures set forth in § 85.478 remain applicable for the 1980 year of production. Exhaust emissions from 1980 year of production vehicles shall not exceed:

(a) Hydrocarbons. 0.25 gram per vehicle kilometer.

(b) Carbon monoxide. 2.1 grams per vehicle kilometer.

(c) Oxides of nitrogen. 0.25 gram per vehicle kilometer.

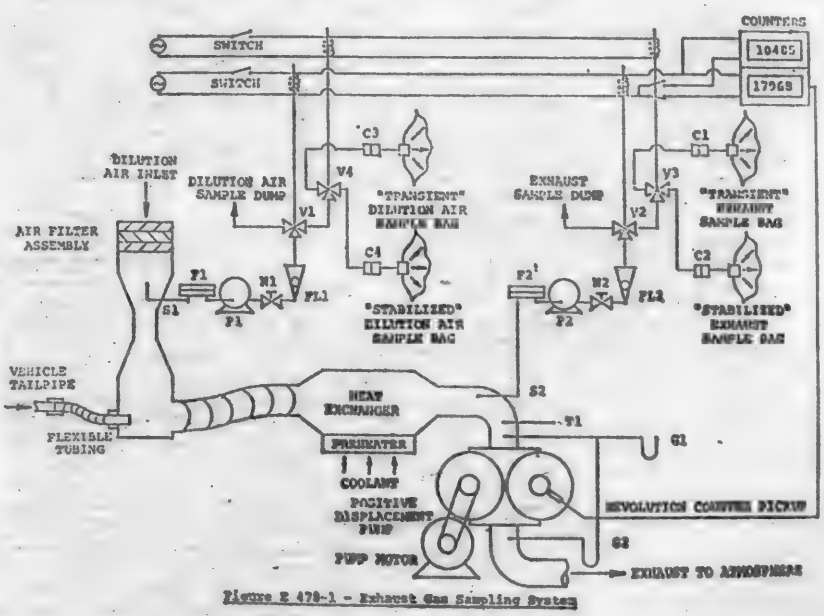
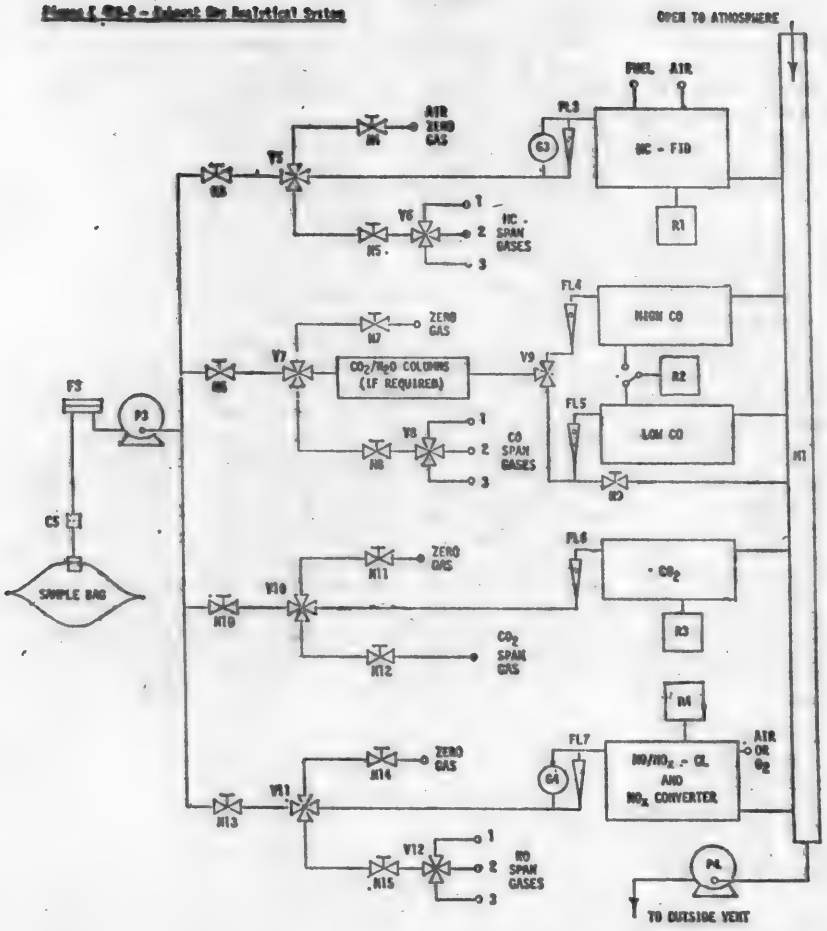


Figure E 478-1 – Exhaust Gas Sampling System

Figure E 478-6 - Exhaust Gas Analytical System



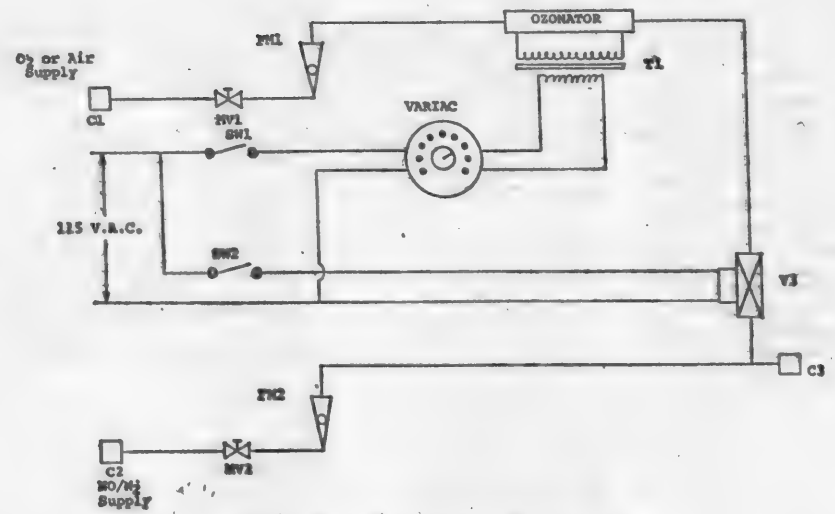


Figure E 478-7 - NOx Converter Efficiency Detector

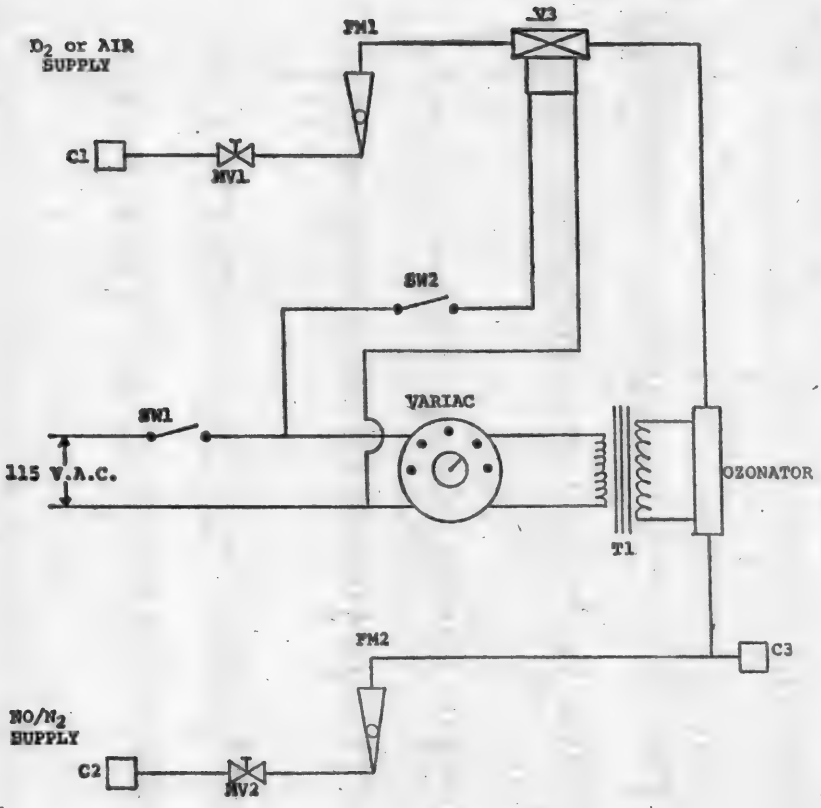


Figure E 478-8 - NOx Converter Efficiency Detector

[FR Doc.75-28178 Filed 10-21-75;8:45 am]

[FRL 437-8]

CONTROL OF AIR POLLUTION FROM NEW MOTOR VEHICLES AND NEW MOTOR VEHICLE ENGINES

Appendices to Motor Vehicle Emission Regulations

Notice is hereby given that the Environmental Protection Agency is considering the revision of the Appendices to Part 85 of Title 40 of the Code of Federal Regulations.

This proposed revision is largely the result of the proposed addition to 40 CFR Part 85 of motorcycle emission regulations. In addition, these appendices are being proposed in the International System of Units (SI) in order to continue the process of conversion for 40 CFR Part 85.

Listed below are the major features of this proposed rule making.

(1) Appendix I(a) is the EPA urban dynamometer driving schedule expressed in a speed (in kilometers per hour (kph)) versus time (in seconds) sequence. If these rounded kph numbers are reconverted to mph numbers and subsequently rounded, the new mph numbers will be slightly different (one tenth of a mph), in a few scattered cases, from the original mph numbers due to the rounding process. However, it is not the EPA's intention to change the current urban driving schedule. Instead, the Agency intends to continue using the original driving schedule trace while changing to the appropriate kph references on the trace.

Appendix I(b) is the modified EPA urban dynamometer driving schedule applicable to motorcycles with engine displacements less than 170 cc (10.4 cu. in.).

(2) Appendix II(a) converts the speeds at which the dynamometer is calibrated to SI units. In addition, the calculation of absorbed road load power is expressed in watts.

Appendix II(b) is the appropriate dynamometer calibration expressed in SI units for motorcycles.

(3) Appendix III, the CVS flow calibration, is likewise converted to SI units. Many of the specifications have been changed very slightly so that convenient SI numbers are used during the calibration.

(4) The durability driving schedule has been divided into three sections. Appendix IV(a) is the same durability schedule currently used by passenger automobile and light truck manufacturers. Appendix IV(b) is this schedule converted to SI units with speeds rounded to convenient SI numbers. Appendix IV(b) will be applicable to motorcycles with engine displacements equal to or greater than 170 cc (10.4 cu. in.). In addition, this schedule may also be used by manufacturers of light duty vehicles, diesel light duty vehicles, light duty trucks, and diesel light duty trucks at their option. It is presently the Agency's intention to delete Appendix IV(a) within the next few years and substitute Appendix IV(b) for those manufacturers using IV(a).

Appendix IV(c) is the durability driving schedule for motorcycles with engine displacements less than 170 cc (10.4 cu. in.). It is similar to Appendix IV(b) with a revised speed for lap eleven more appropriate to the top speed of these vehicles.

Due to the possibility of a motorcycle's front wheel leaving the ground under wide open throttle, a provision has been added to Appendices IV (b) and (c) to allow modification of the durability schedule with the advance approval of the Administrator.

(5) Appendix VI is a slightly revised list of those components which may affect emissions from motor vehicles and used in the preparation of maintenance instructions by manufacturers.

(6) Appendix VII was proposed originally on December 23, 1974 (FR, Vol. 39, No. 247). It is included in this NPRM to solicit comments on incorporating it in the motorcycle regulations. It has been changed slightly in order to include the parameter, oil injection metering system, commonly found on motorcycles and to incorporate SI terminology.

Comments are solicited from light duty vehicle, diesel light duty vehicle, light duty truck, diesel light duty truck, gasoline fueled heavy duty engine, and diesel heavy duty engine manufacturers and other interested parties on the SI conversion and subsequent rounding of the Appendices to 40 CFR Part 85. In addition, comments are solicited from motorcycle manufacturers on including these proposed Appendices in the motorcycle emission regulations.

Interested persons may participate in the rule making proceeding by submitting written comments to: Deputy Assistant Administrator, Office of Mobile Source Air Pollution Control, 401 M Street, SW., Washington, D.C. 20460. It is requested but not required that 10 copies be submitted.

All comments received before the close of business on January 20, 1976 will be considered. To the extent possible, comments filed after the closing date will also be considered. Comments received pursuant to this proposal will be available for public inspection and copying at the U.S. Environmental Protection Agency Public Information Reference

Unit, Room 2922 (EPA Library), 401 M Street, SW., Washington, D.C. 20460.

Final regulations, modified as the Administrator deems appropriate after consideration of comments to the NPRM, will be promulgated as soon as practicable after such consideration.

This Notice of Proposed Rule Making is issued under the authority of Sections 202, 206, and 301(a) of the Clean Air Act, as amended (42 U.S.C. 1857f–1, 1857f–5, and 1857g(a)).

Dated: October 14, 1975.

JOHN QUARLES,
Acting Administrator.

APPENDIX I

URBAN DYNAMOMETER DRIVING SCHEDULES

(a) EPA Urban Dynamometer Driving Schedule for Light Duty Vehicles, Diesel Light Duty Vehicles, Light Duty Trucks, Diesel Light Duty Trucks, and Motorcycles with engine displacements equal to or greater than 170 cc (10.4 cu. in.).

SPEED VERSUS TIME SEQUENCE

Time (seconds):	Speed (kilometers per hour)
0	0
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	0
12	0
13	0
14	0
15	0
16	0
17	0
18	0
19	0
20	0
21	4.8
22	9.5
23	13.8
24	18.5
25	23.0
26	27.2
27	27.8
28	29.1
29	33.3
30	34.9
31	36.0
32	36.2
33	35.6
34	34.6
35	33.6
36	32.8
37	31.9
38	27.4
39	24.0
40	24.0
41	24.5
42	24.9
43	25.7
44	27.5
45	30.7
46	34.0
47	36.5
48	36.8
49	36.5
50	36.4
51	34.3
52	30.6
53	27.5
54	25.4
55	25.4
56	28.5
57	31.9
58	34.8
59	37.3
60	38.9
61	39.6
62	40.1
63	40.2
64	39.6
65	39.4
66	39.3
67	39.9
68	39.6
69	39.6
70	39.6
71	40.4
72	41.2
73	41.4
74	40.9
75	40.1
76	40.2
77	40.9
78	41.8
79	41.8
80	41.4
81	42.0
82	43.0
83	44.3
84	46.0
85	47.2
86	48.0
87	48.4
88	48.9
89	49.4
90	49.4
91	49.1
92	48.9
93	48.8
94	48.9
95	49.6
96	48.9
97	48.1
98	47.5
99	48.0
100	48.8
101	49.4
102	49.7
103	49.9
104	49.7
105	48.9
106	48.0
107	48.1
108	48.6
109	49.4
110	50.2
111	51.2
112	51.8
113	52.1
114	51.8
115	51.0
116	46.0
117	40.7
118	35.4
119	30.1
120	24.8
121	19.5
122	14.2
123	8.9
124	3.5
125	0
126	0
127	0
128	0
129	0
130	0
131	0
132	0
133	0
134	0
135	0
136	0
137	0
138	0
139	0
140	0
141	0
142	0
143	0
144	0
145	0
146	0
147	0
148	0
149	0
150	0
151	0
152	0
153	0
154	0
155	0
156	0
157	0
158	0
159	0
160	0
161	0
162	0
163	0
164	5.3
165	10.6
166	15.9
167	21.2
168	26.6
169	31.9
170	35.7
171	39.1
172	41.5
173	42.5
174	41.4
175	40.4
176	39.8
177	40.2
178	40.6
179	40.9
180	41.5
181	43.8
182	42.6
183	38.6
184	36.5
185	31.2
186	28.5
187	27.7
188	29.1
189	29.9
190	32.2
191	35.7
192	39.4
193	43.9
194	49.1
195	53.9
196	58.3
197	60.0
198	63.2
199	65.2
200	67.8
201	70.0
202	72.6
203	74.0
204	75.3
205	76.4
206	76.4
207	76.1
208	76.0
209	75.6
210	75.6
211	75.6
212	75.6
213	75.6
214	76.0
215	76.5
216	77.1
217	78.1
218	79.0
219	79.7
220	80.5
221	81.4
222	82.1
223	82.9
224	84.0
225	85.6
226	87.1
227	87.9
228	88.4
229	88.5
230	88.4
231	87.9
232	87.9
233	88.2
234	88.7
235	89.3
236	89.6
237	90.3
238	90.6
239	91.1
240	91.2
241	91.2
242	90.9
243	90.9
244	90.9
245	90.9
246	90.9
247	90.9
248	90.8
249	90.3
250	89.8
251	88.7
252	87.9
253	87.2
254	86.9
255	86.4
256	86.3
257	86.7
258	86.9
259	87.1
260	87.1
261	86.6
262	85.9
263	85.3
264	84.7
265	83.8
266	84.3
267	83.7
268	83.5
269	83.2
270	82.9
271	83.0
272	83.4
273	83.8
274	84.5
275	85.3
276	86.1
277	86.9
278	88.4
279	89.2
280	89.5
281	90.1
282	90.1
283	89.8
284	88.8
285	87.7
286	86.3
287	84.5
288	82.9
289	82.9
290	82.9
291	82.2
292	80.6
293	80.5
294	80.6
295	80.5
296	79.8
297	79.7
298	79.7
299	79.7
300	79.0
301	78.2
302	77.4
303	76.0
304	74.2
305	72.4
306	70.5
307	68.6
308	66.8
309	64.9
310	62.0
311	59.5
312	56.6
313	54.4
314	52.3
315	50.7
316	49.2
317	49.1
318	48.3
319	46.7
320	44.3
321	39.9
322	34.6
323	32.3
324	30.7
325	29.8
326	27.4
327	24.9
328	20.1
329	17.4
330	12.9
331	7.6
332	2.3
333	0
334	0
335	0
336	0
337	0
338	0
339	0
340	0
341	0
342	0
343	0
344	0
345	0
346	0
347	1.6
348	6.9
349	12.2
350	17.5
351	22.9
352	27.8
353	32.2
354	36.2
355	38.1
356	40.6
357	42.8
358	45.2
359	48.3
360	49.6
361	50.9
362	51.7
363	52.8
364	54.1
365	55.5
366	55.7
367	56.2
368	56.0
369	55.5
370	55.8
371	57.1
372	57.9
373	57.9
374	57.9
375	57.9
377	57.9
376	57.9
378	58.1
379	58.6
380	58.7
381	58.6
382	57.9
383	56.5
384	54.9
385	53.9
386	50.5
387	46.7
388	41.4
389	37.0
390	32.7
391	28.2
392	23.3
393	19.3
394	14.0
395	8.7
396	3.4
397	0
398	0
399	0
400	0
401	0
402	0
403	4.2
404	9.5
405	14.8
406	20.1
407	25.4
408	30.7
409	36.0
410	40.2
411	41.2
412	44.3
413	46.7
414	48.3
415	48.4
416	48.3
417	47.8
418	47.2
419	46.3
420	45.1
421	40.2
422	34.9
423	29.6
424	24.3
425	19.0
426	13.7
427	8.4
428	3.1
429	0
430	0
431	0
432	0
433	0
434	0
435	0
436	0
437	0
438	0
439	0
440	0

Time (seconds):	Speed (kilometers per hour)
441	0
442	0
443	0
444	0
445	0
446	0
447	0
448	5.3
449	10.6
450	15.9
451	21.2
452	26.6
453	31.9
454	37.2
455	42.5
456	44.7
457	46.8
458	50.7
459	53.1
460	54.1
461	56.0
462	56.5
463	57.3
464	58.1
465	57.9
466	58.1
467	58.3
468	57.9
469	57.5
469	57.5
470	57.9
471	57.9
472	57.3
473	57.1
474	57.0
475	56.6
476	56.6
477	56.6
478	56.6
479	56.6
480	56.6
481	56.3
482	56.5
483	56.6
484	57.1
485	56.6
486	56.3
487	56.3
488	56.3
489	56.0
490	55.7
491	55.5
492	53.9
493	51.5
494	48.4
495	45.1
496	41.0
497	36.2
498	31.9
499	26.6
500	21.2
501	16.6
502	11.6
503	6.4
504	1.6
505	0
506	0
507	0
508	0
509	0
510	0
511	1.9
512	5.6
513	8.9
514	10.5
515	13.7
516	15.4
517	16.9
518	19.2
519	23.5
520	25.7
521	28.5
522	30.6
523	32.3
524	33.8
525	35.4
526	37.0
527	38.3
528	39.4
529	40.1
530	40.2
531	40.2
532	40.2
533	40.2
534	40.2
535	40.2
536	41.2
537	41.5
538	41.8
539	41.2
540	40.6
541	40.2
542	40.2
543	40.2
544	39.3
545	37.2
546	31.9
547	26.6
548	21.2
549	15.9
550	10.6
551	5.3
552	0
553	0
554	0
555	0
556	0
557	0
558	0
559	0
560	0
561	0
562	0
563	0
564	0
565	0
566	0
567	0
568	0
569	5.3
570	10.6
571	15.9
572	20.9
573	23.5
574	25.7
575	27.4
576	27.4
577	27.4
578	28.2
579	28.5
580	28.5
581	28.2
582	27.4
583	27.2
584	26.7
585	27.4
586	27.5
587	27.4
588	26.7
589	26.6
590	26.6
591	26.7
592	27.4
593	28.3
594	29.8
595	30.9
596	32.5
597	33.8
598	34.0
599	34.1
600	34.8
601	35.4
602	36.0
603	36.2
604	36.2
605	36.2
606	36.5
607	38.1
608	40.4
609	41.8
610	42.6
611	43.5
612	42.0
613	36.7
614	31.4
615	26.1
616	20.8
617	15.4
618	10.1
619	4.8
620	0
621	0
622	0
623	0
624	0
625	0
626	0
627	0
628	0
629	0
630	0
631	0
632	0
633	0
634	0
635	0
636	0
637	0
638	0
639	0
640	0
641	0
642	0
643	0
644	0
645	0
646	3.2
647	7.2
648	12.6
649	16.4
650	20.1
651	22.5
652	24.6
653	26.2
654	31.5
655	32.0
656	35.7
657	37.5
658	39.4
659	40.7
660	41.2
661	41.8
662	42.0
663	42.2
664	42.2
665	42.5
666	42.6
667	42.6
668	41.8
669	41.0
670	36.0
671	34.4
672	29.8
673	26.4
674	23.3
675	18.7
676	14.0
677	9.3
678	5.6
679	3.2
680	0
681	0
682	0
683	0
684	0
685	0
686	0
687	0
688	0
689	0
690	0
691	0
692	0
693	0
694	2.3
695	5.3
696	7.1
697	10.5
698	14.8
699	18.2
700	21.7
701	23.5
702	26.4
703	26.9
704	26.6
705	26.6
706	29.3
707	30.9
708	32.3
709	34.6
710	36.2
711	36.2
712	35.6
713	36.5
714	37.5
715	37.8
716	36.2
717	34.8
718	33.0
719	29.0
720	24.1
721	19.3
722	14.5
723	10.0
724	7.2
725	4.8
726	3.4
727	0.8
728	0.8
729	5.1
730	10.5
731	15.4
732	20.1
733	22.5
734	25.7
735	29.0
736	31.5
737	34.6
738	37.2
739	39.4
740	41.0
741	42.6
742	43.6
743	44.4
744	44.9
745	45.5
746	46.0
747	46.0
748	45.5
749	45.4
750	45.1
751	44.3
752	43.1
753	41.0
754	37.8
755	34.6
756	30.6
757	26.6
758	24.0
759	20.1
760	15.1
761	10.0
762	4.8
763	2.4
764	2.4
765	0.8
766	0
767	4.8
768	10.1
769	15.4
770	20.8
771	25.4
772	28.2
773	29.8
774	31.4
775	33.2
776	35.4
777	37.3
778	40.2
779	42.6
780	44.3
781	45.1
782	45.5
783	46.5
784	46.5
785	46.5
786	46.3
787	45.9
788	45.5
789	45.5
790	45.5
791	45.4
792	44.4
793	44.3
794	44.3
795	44.3
796	44.3
797	44.3
798	44.3
799	44.4
800	45.1
801	45.9
802	48.3
803	49.9
804	51.5
805	53.1
806	53.1
807	54.1
808	54.7
809	55.2
810	55.0
811	54.7
812	54.7
813	54.6
814	54.1
815	53.3
816	53.1
817	52.3
818	51.5
819	51.3
820	50.9
821	50.7
822	49.2
823	48.3
824	48.1
825	48.1
826	48.1
827	48.1
828	47.6
829	47.5
830	47.5
831	47.2
832	46.3
833	45.4
834	44.6
835	43.5
836	41.0
837	38.1
838	35.4
839	33.0
840	30.9
841	30.9
842	32.3
843	33.6
844	34.4
845	35.4
846	36.4
847	37.3
848	38.6
849	40.2
850	41.8
851	42.8
852	42.8
853	43.1
854	43.5
855	43.8
856	44.7
857	45.2
858	46.3
859	46.5
860	46.7
861	46.8
862	46.7
863	45.2
864	44.3
865	43.5
866	41.5
867	40.2
868	39.4
869	39.9
870	40.4
871	41.0
872	41.4
873	42.2
874	43.3
875	44.3
876	44.7
877	45.7
878	46.7
879	47.0
880	46.8
881	46.7
882	46.5
883	45.9
884	45.2
885	45.1
886	45.1
887	44.4
888	43.8
889	42.8
890	43.5
891	44.3
892	44.7
893	45.1
894	44.7
895	45.1
896	45.1
897	45.1
898	44.6
899	44.1
900	43.3
901	42.8
902	42.6
903	42.6
904	42.6
905	42.3
906	42.2
907	42.2
908	41.7
909	41.2
910	41.2
911	41.7
912	41.5
913	41.0
914	39.6
915	37.8
916	35.7
917	34.8
918	34.8
919	34.9
920	36.4
921	37.7
922	38.6
923	38.9
924	39.3
925	40.1
926	40.4
927	40.6
928	40.7
929	41.0
930	40.6
931	40.2
932	40.2
933	40.2
934	39.8
935	39.4
936	39.1
937	39.1
938	39.4
939	40.2
940	40.2

Time (seconds):	Speed (kilometers per hour)
941	39.6
942	39.6
943	38.8
944	39.4
945	40.4
946	41.2
947	40.4
948	38.6
949	35.4
950	32.3
951	27.2
952	21.9
953	16.6
954	11.3
955	6.0
956	0.6
957	0
958	0
959	0
960	3.2
961	8.5
962	13.8
963	19.2
964	24.5
965	28.2
966	29.9
967	32.2
968	34.0
969	35.4
970	37.0
971	39.4
972	42.3
973	44.3
974	45.2
975	45.7
976	45.9
977	45.9
978	45.9
979	44.6
980	44.3
981	43.8
982	43.1
983	42.6
984	41.8
985	41.4
986	40.6
987	38.6
988	35.4
989	34.6
990	34.6
991	35.1
992	36.2
993	37.0
994	36.7
995	36.7
996	37.0
997	36.5
998	36.5
999	36.5
1,000	37.8
1,001	38.6
1,002	39.6
1,003	39.9
1,004	40.4
1,005	41.0
1,006	41.2
1,007	41.0
1,008	40.2
1,009	38.8
1,010	38.1
1,011	37.3
1,012	36.9
1,013	36.2
1,014	35.4
1,015	34.8
1,016	33.6
1,017	28.2
1,018	22.9
1,019	17.5
1,020	12.2
1,021	6.9
1,022	1.6
1,023	0
1,024	0
1,025	0
1,026	0
1,027	0
1,028	0
1,029	0
1,030	0
1,031	0
1,032	0
1,033	0
1,034	0
1,035	0
1,036	0
1,037	0
1,038	0
1,039	0
1,040	0
1,041	0
1,042	0
1,043	0
1,044	0
1,045	0
1,046	0
1,047	0
1,048	0
1,049	0
1,050	0
1,051	0
1,052	0
1,053	1.9
1,054	6.4
1,055	11.7
1,056	17.1
1,057	22.4
1,058	27.4
1,059	29.8
1,060	32.2
1,061	35.1
1,062	37.0
1,063	38.6
1,064	39.9
1,065	41.2
1,066	42.6
1,067	43.1
1,068	44.1
1,069	44.9
1,070	45.5
1,071	45.1
1,072	44.3
1,073	43.5
1,074	43.5
1,075	42.3
1,076	39.4
1,077	36.2
1,078	34.6
1,079	33.2
1,080	29.0
1,081	24.1
1,082	19.8
1,083	17.9
1,084	17.1
1,085	16.1
1,086	15.3
1,087	14.6
1,088	14.0
1,089	13.8
1,090	14.2
1,091	14.5
1,092	14.0
1,093	13.8
1,094	12.9
1,095	11.3
1,096	8.0
1,097	6.8
1,098	4.2
1,099	1.6
1,100	0
1,101	0.2
1,102	1.0
1,103	2.6
1,104	5.8
1,105	11.1
1,106	16.1
1,107	20.6
1,108	22.5
1,109	23.3
1,110	25.7
1,111	29.1
1,112	32.2
1,113	33.8
1,114	34.1
1,115	34.3
1,116	34.4
1,117	34.9
1,118	36.2
1,119	37.0
1,120	38.3
1,121	39.4
1,122	40.2
1,123	40.1
1,124	39.9
1,125	40.2
1,126	40.9
1,127	41.5
1,128	41.8
1,129	42.5
1,130	42.8
1,131	43.3
1,132	43.5
1,133	43.5
1,134	43.5
1,135	43.3
1,136	43.1
1,137	43.1
1,138	42.6
1,139	42.5
1,140	41.8
1,141	41.0
1,142	39.6
1,143	37.8
1,144	34.6
1,145	32.2
1,146	28.2
1,147	25.7
1,148	22.5
1,149	17.2
1,150	11.9
1,151	6.6
1,152	1.3
1,153	0
1,154	0
1,155	0
1,156	0
1,157	0
1,158	0
1,159	0
1,160	0
1,161	0
1,162	0
1,163	0
1,164	0
1,165	0
1,166	0
1,167	0
1,168	0
1,169	3.4
1,170	8.7
1,171	14.0
1,172	19.3
1,173	24.6
1,174	29.9
1,175	34.0
1,176	37.0
1,177	37.8
1,178	37.0
1,179	36.2
1,180	32.2
1,181	26.9
1,182	21.6
1,183	16.3
1,184	10.9
1,185	5.6
1,186	0.3
1,187	0
1,188	0
1,189	0
1,190	0
1,191	0
1,192	0
1,193	0
1,194	0
1,195	0
1,196	0
1,197	0.3
1,198	2.4
1,199	5.6
1,200	10.5
1,201	15.8
1,202	19.3
1,203	20.8
1,204	20.9
1,205	20.3
1,206	20.6
1,207	21.1
1,208	21.1
1,209	22.5
1,210	24.9
1,211	27.4
1,212	29.9
1,213	31.7
1,214	33.8
1,215	34.6
1,216	35.1
1,217	35.1
1,218	34.6
1,219	34.1
1,220	34.6
1,221	35.1
1,222	35.4
1,223	35.2
1,224	34.9
1,225	34.6
1,226	34.6
1,227	34.4
1,228	33.3
1,229	31.4
1,230	30.9
1,231	31.5
1,232	31.9
1,233	32.2
1,234	31.4
1,235	28.2
1,236	24.9
1237	20.9
1238	16.1
1239	12.9
1240	9.7
1241	6.4
1242	4.0
1243	1.1
1244	0
1245	0
1246	0
1247	0
1248	0
1249	0
1250	0
1251	0
1252	1.6
1253	1.6
1254	1.6
1255	1.6
1256	1.6
1257	2.6
1258	4.8
1259	6.4
1260	8.0
1261	10.1
1262	12.9
1263	16.1
1264	16.9
1265	15.3
1266	13.7
1267	12.2
1268	14.2
1269	17.7
1270	22.5
1271	27.4
1272	31.4
1273	33.8
1274	35.1
1275	35.7
1276	37.0
1277	38.0
1278	38.8
1279	39.4
1280	39.4
1281	38.6
1282	37.8
1283	37.8
1284	37.8
1,285	37.8
1,286	37.8
1,287	37.8
1,288	38.6
1,289	38.8
1,290	39.4
1,291	39.8
1,292	40.2
1,293	40.9
1,294	41.2
1,295	41.4
1,296	41.8
1,297	42.2
1,298	43.5
1,299	44.7
1,300	45.5
1,301	46.7
1,302	46.8
1,303	46.7
1,304	45.1
1,305	39.8
1,306	34.4
1,307	29.1
1,308	23.8
1,309	18.5
1,310	13.2
1,311	7.9
1,312	2.6
1,313	0
1,314	0
1,315	0
1,316	0
1,317	0
1,318	0
1,319	0
1,320	0
1,321	0
1,322	0
1,323	0
1,324	0
1,325	0
1,326	0
1,327	0
1,328	0
1,329	0
1,330	0
1,331	0
1,332	0
1,333	0
1,334	0
1,335	0
1,336	0
1,337	0
1,338	2.4
1,339	7.7
1,340	13.0
1,341	18.3
1,342	21.2
1,343	24.3
1,344	27.0
1,345	29.5
1,346	31.4
1,347	32.7
1,348	34.3
1,349	35.2
1,350	35.6
1,351	36.0
1,352	35.4
1,353	34.8
1,354	34.0
1,355	33.0
1,356	32.2
1,357	31.5
1,358	29.8
1,359	28.2
1,360	26.6
1,361	24.9
1,362	22.5
1,363	17.7
1,364	12.9
1,365	8.4
1,366	4.0
1,367	0
1,368	0
1,369	0
1,370	0
1,371	0

(b) EPA Urban Dynamometer Driving Schedule for Motorcycles with engine displacements less than 170 cc (10.4 cu. in.).

SPEED VERSUS TIME SEQUENCE

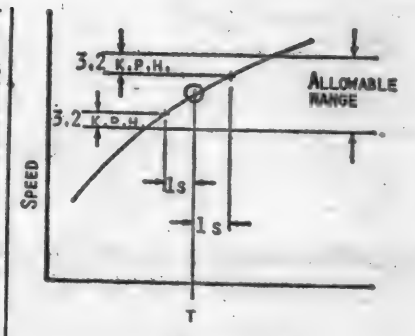
Time (seconds):	Speed (kilometers per hour)
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	0
12	0
13	0
14	0
15	0
16	0
17	0
18	0
19	0
20	0
21	4.8
22	9.5
23	13.8
24	18.5
25	23.0
26	27.2
27	27.8
28	29.1
29	33.3
30	34.9
31	36.0
32	36.2
33	35.6
34	34.6
35	33.6
36	32.8
37	31.9
38	27.4
39	24.0
40	24.0
41	24.5
42	24.9
43	25.7
44	27.5
45	30.7
46	34.0
47	36.5
48	36.9
49	36.5
50	36.4
51	34.3
52	30.6

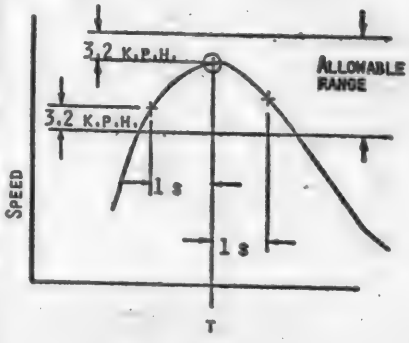
Time (seconds):	Speed (kilometers per hour)
53	27.5
54	25.4
55	25.4
56	28.5
57	31.9
58	34.8
59	37.3
60	38.9
61	39.6
62	40.1
63	40.2
64	39.6
65	39.4
66	39.8
67	39.9
68	39.8
69	39.6
70	39.6
71	40.4
72	41.2
73	41.4
74	40.9
75	40.1
76	40.2
77	40.9
78	41.8
79	41.8
80	41.4
81	42.0
82	43.0
83	44.3
84	46.0
85	47.2
86	48.0
87	48.4
88	48.9
89	49.4
90	49.4
91	49.1
92	48.9
93	48.8
94	48.9
95	49.6
96	48.9
97	48.1
98	47.5
99	48.0
100	48.8
101	49.4
102	49.7
103	49.9
104	49.7
105	48.9
106	48.0
107	48.1
108	48.6
109	49.4
110	50.2
111	51.2
112	51.8
113	52.1
114	51.8
115	51.0
116	46.0
117	40.7
118	35.4
119	30.1
120	24.8
121	19.5
122	14.2
123	8.9
124	3.5
125	0
126	0
127	0
128	0
129	0
130	0
131	0
132	0
133	0
134	0
135	0
136	0
137	0
138	0
139	0
140	0
141	0
142	0
143	0
144	0
145	0
146	0
147	0
148	0
149	0
150	0
151	0
152	0
153	0
154	0
155	0
156	0
157	0
158	0
159	0
160	0
161	0
162	0
163	0
164	3.4
165	6.8
166	10.3
167	13.7
168	17.1
169	20.5
170	23.0
171	25.2
172	26.7
173	27.4
174	26.6
175	26.0
176	25.6
177	25.9
178	26.1
179	26.3
180	26.7
181	28.2
182	27.5
183	24.9
184	23.5
185	20.1
186	18.3
187	17.8
188	18.8
189	19.3
190	20.7
191	23.0
192	25.4
193	28.3
194	31.6
195	34.7
196	37.5
197	38.6
198	40.7
199	42.0
200	43.6
201	45.1
202	46.7
203	47.7
204	48.5
205	49.2
206	49.3
207	49.0
208	48.9
209	48.7
210	48.7
211	48.7
212	48.7
213	48.7
214	48.9
215	49.1
216	49.6
217	50.2
218	50.9
219	51.3
220	51.8
221	52.4
222	52.8
223	53.4
224	54.1
225	55.1
226	56.0
227	56.6
228	56.9
229	57.0
230	56.9
231	56.6
232	56.6
233	56.8
234	57.1
235	57.5
236	57.7
237	58.1
238	58.3
239	58.6
240	58.7
241	58.7
242	58.5
243	58.5
244	58.5
245	58.5
246	58.5
247	58.5
248	58.4
249	58.1
250	57.8
251	57.1
252	56.6
253	56.2
254	55.9
255	55.6
256	55.5
257	55.8
258	55.9
259	56.0
260	56.0
261	55.7
262	55.3
263	54.9
264	54.5
265	54.0
266	54.3
267	53.9
268	53.8
269	53.6
270	53.4
271	53.5
272	53.7
273	54.0
274	54.4
275	54.9
276	55.4
277	55.9
278	56.9
279	57.4
280	57.6
281	58.0
282	58.0
283	57.8
284	57.2
285	56.5
286	55.5
287	54.4
288	53.4
289	53.4
290	53.4
291	52.9
292	51.9
293	51.8
294	51.9
295	51.8
296	51.4
297	51.3
298	51.3
299	51.3
300	50.9
301	50.3
302	49.8
303	48.9
304	47.8
305	46.6
306	45.4
307	44.1
308	43.0
309	41.8
310	39.9
311	38.3
312	36.5
313	35.0
314	33.7
315	32.6
316	31.7
317	31.6
318	31.1
319	30.0
320	28.5
321	25.7
322	22.3
323	20.8
324	19.8
325	19.2
326	17.6
327	16.1
328	12.9
329	11.2
330	8.3
331	4.9
332	1.5
333	0
334	0
335	0
336	0
337	0
338	0
339	0
340	0
341	0
342	0
343	0
344	0
345	0
346	0
347	1.6
348	6.9
349	12.2
350	17.5
351	22.9
352	27.8
353	32.2
354	36.2
355	38.1
356	40.6
357	42.8
358	45.2
359	48.3
360	49.6
361	50.9
362	51.7
363	52.8
364	54.1
365	55.5
366	55.7
367	56.2
368	56.0
369	55.5
370	55.8
371	57.1
372	57.9
373	57.9
374	57.9
375	57.9
376	57.9
377	57.9
378	58.1
379	58.6
380	58.7
381	58.6
382	57.9
383	56.5
384	54.9
385	53.9
386	50.5
387	46.7
388	41.4
389	37.0
390	32.7
391	28.2
392	23.3
393	19.3
394	14.0
395	8.7
396	3.4
397	0
398	0
399	0
400	0
401	0
402	0
403	4.2
404	9.5
405	14.8
406	20.1
407	25.4
408	30.7
409	36.0
410	40.2
411	41.2
412	44.3
413	46.7
414	48.3
415	48.4
416	48.3
417	47.8
418	47.2
419	46.3
420	45.1
421	40.2
422	34.9
423	29.6
424	24.3
425	19.0
426	13.7
427	8.4
428	3.1
429	0
430	0
431	0
432	0
433	0
434	0
435	0
436	0
437	0
438	0
439	0
440	0
441	0
442	0
443	0
444	0
445	0
446	0
447	0
448	5.3
449	10.6
450	15.9
451	21.2
452	26.6
453	31.9
454	37.2
455	42.5
456	44.7
457	46.8
458	50.7
459	53.1
460	54.1
461	56.0
462	56.5
463	57.3
464	58.1
465	57.9
466	58.1
467	58.3
468	57.9
469	57.5
470	57.9
471	57.9
472	57.3
473	57.1
474	57.0
475	56.6
476	56.6
477	56.6
478	56.6
479	56.6
480	56.6
481	56.3
482	56.5
483	56.6
484	57.1
485	56.6
486	56.3
487	56.3
488	56.3
489	56.0
490	55.7
491	55.5
492	53.9
493	51.5
494	48.4
495	45.1
496	41.0
497	36.2
498	31.9
499	26.6
500	21.2
501	16.6
502	11.6
503	6.4
504	1.6
505	0
506	0
507	0
508	0
509	0
510	0
511	1.9
512	5.6
513	8.9
514	10.5
515	13.7
516	15.4
517	16.9
518	19.2
519	22.5
520	25.7
521	28.5
522	30.6
523	32.3
524	33.8
525	35.4
526	37.0
527	38.3
528	39.4
529	40.1
530	40.2
531	40.2
532	40.2
533	40.2
534	40.2
535	40.2
536	41.2
537	41.5
538	41.8
539	41.2
540	40.6
541	40.2
542	40.2
543	40.2
544	39.3
545	37.2
546	31.9
547	26.6
548	21.2
549	15.9
550	10.6
551	5.3
552	0
553	0
554	0
555	0
556	0

Time (seconds):	Speed (kilometers per hour)
557	0
558	0
559	0
560	0
561	0
562	0
563	0
564	0
565	0
566	0
567	0
568	0
569	5.3
570	10.6
571	15.9
572	20.9
573	23.5
574	25.7
575	27.4
576	27.4
577	27.4
578	28.2
579	28.5
580	28.5
581	28.2
582	27.4
583	27.2
584	26.7
585	27.4
586	27.5
587	27.4
588	26.7
589	26.6
590	26.6
591	26.7
592	27.4
593	28.3
594	29.8
595	30.9
596	32.5
597	33.8
598	34.0
599	34.1
600	34.8
601	35.4
602	36.0
603	36.2
604	36.2
605	36.2
606	36.5
607	38.1
608	40.4
609	41.8
610	42.6
611	43.5
612	42.0
613	36.7
614	31.4
615	26.1
616	20.8
617	15.4
618	10.1
619	4.8
620	0
621	0
622	0
623	0
624	0
625	0
626	0
627	0
628	0
629	0
630	0
631	0
632	0
633	0
634	0
635	0
636	0
637	0
638	0
639	0
640	0
641	0
642	0
643	0
644	0
645	0
646	3.2
647	7.2
648	12.6
649	16.4
650	20.1
651	22.5
652	24.6
653	28.2
654	31.5
655	33.8
656	35.7
657	37.5
658	39.4
659	40.7
660	41.2
661	41.8
662	42.0
663	42.2
664	42.2
665	42.5
666	42.6
667	42.6
668	41.8
669	41.0
670	38.0
671	34.4
672	29.8
673	26.4
674	23.3
675	18.7
676	14.0
677	9.3
678	5.6
679	3.2
680	0
681	0
682	0
683	0
684	0
685	0
686	0
687	0
688	0
689	0
690	0
691	0
692	0
693	0
694	2.3
695	5.3
696	7.1
697	10.5
698	14.8
699	18.2
700	21.7
701	23.5
702	26.4
703	26.9
704	26.6
705	26.6
706	29.3
707	30.9
708	32.3
709	34.6
710	36.2
711	36.2
712	35.6
713	36.5
714	37.5
715	37.8
716	36.2
717	34.8
718	33.0
719	29.0
720	24.1
721	19.3
722	14.5
723	10.0
724	7.2
725	4.8
726	3.4
727	0.8
728	0.8
729	5.1
730	10.5
731	15.4
732	20.1
733	22.5
734	25.7
735	29.0
736	31.5
737	34.6
738	37.2
739	39.4
740	41.0
741	42.6
742	43.6
743	44.4
744	44.9
745	45.5
746	46.0
747	46.0
748	45.5
749	45.4
750	45.1
751	44.3
752	43.1
753	41.0
754	37.8
755	34.6
756	30.6
757	26.6
758	24.0
759	20.1
760	15.1
761	10.0
762	4.8
763	2.4
764	2.4
765	0.8
766	0
767	4.8
768	10.1
769	15.4
770	20.8
771	25.4
772	28.2
773	29.6
774	31.4
775	33.3
776	35.4
777	37.3
778	40.2
779	42.6
780	44.3
781	45.1
782	45.5
783	46.5
784	46.5
785	46.5
786	46.3
787	45.9
788	45.5
789	45.5
790	45.5
791	45.4
792	44.4
793	44.3
794	44.3
795	44.3
796	44.3
797	44.3
798	44.3
799	44.4
800	45.1
801	45.9
802	48.3
803	49.9
804	51.5
805	53.1
806	53.1
807	54.1
808	54.7
809	55.2
810	55.0
811	54.7
812	54.7
813	54.6
814	54.1
815	53.3
816	53.1
817	52.3
818	51.5
819	51.3
820	50.9
821	50.7
822	49.2
823	48.3
824	48.1
825	48.1
826	48.1
827	48.1
828	47.6
829	47.5
830	47.5
831	47.2
832	46.5
833	45.4
834	44.6
835	43.5
836	41.0
837	38.1
838	35.4
839	33.0
840	30.9
841	30.9
842	32.3
843	33.6
844	34.4
845	35.4
846	36.4
847	37.3
848	38.6
849	40.2
850	41.8
851	42.8
852	42.8
853	43.1
854	43.5
855	43.8
856	44.7
857	45.2
858	46.3
859	46.5
860	46.7
861	46.8
862	46.7
863	45.2
864	44.3
865	43.5
866	41.5
867	40.2
868	39.4
869	39.9
870	40.4
871	41.0
872	41.4
873	42.2
874	43.3
875	44.3
876	44.7
877	45.7
878	46.7
879	47.0
880	46.8
881	46.7
882	46.5
883	45.9
884	45.2
885	45.1
886	45.1
887	44.4
888	43.8
889	42.8
890	43.5
891	44.3
892	44.7
893	45.1
894	44.7
895	45.1
896	45.1
897	45.1
898	44.6
899	44.1
900	43.3
901	42.8
902	42.6
903	42.6
904	42.6
905	42.3
906	42.2
907	42.2
908	41.7
909	41.2
910	41.2
911	41.7
912	41.5
913	41.0
914	39.6
915	37.8
916	35.7
917	34.8
918	34.8
919	34.9
920	36.4
921	37.7
922	38.6
923	38.9
924	39.3
925	40.1
926	40.4
927	40.6
928	40.7
929	41.0
930	40.6
931	40.2
932	40.2
933	40.2
934	39.8
935	39.4
936	39.1
937	39.1
938	39.4
939	40.2
940	40.2
941	39.6
942	39.6
943	38.8
944	39.4
945	40.4
946	41.2
947	40.4
948	38.6
949	35.4
950	32.3
951	27.2
952	21.9
953	16.6
954	11.3
955	6.0
956	0.6
957	0
958	0
959	0
960	3.2
961	8.5
962	13.8
963	19.2
964	24.5
965	28.2
966	29.9
967	32.2
968	34.0
969	35.4
970	37.0
971	39.4
972	42.3
973	44.3
974	45.2
975	45.7
976	45.9
977	45.9
978	45.9
979	44.6
980	44.3
981	43.8
982	43.1
983	42.6
984	41.8
985	41.4
986	40.6
987	38.6
988	35.4
989	34.6
990	34.6
991	35.1
992	36.2
993	37.0
994	36.7
995	36.7
996	37.0
997	36.5
998	36.5
999	36.5
1,000	37.8
1,001	38.6
1,002	39.6
1,003	39.9
1,004	40.4
1,005	41.0
1,006	41.2
1,007	41.0
1,008	40.2
1,009	38.8
1,010	38.1
1,011	37.3
1,012	36.9
1,013	36.2
1,014	35.4
1,015	34.8
1,016	33.0
1,017	28.2
1,018	22.9
1,019	17.5
1,020	12.2
1,021	6.9
1,022	1.6
1,023	0
1,024	0
1,025	0
1,026	0
1,027	0
1,028	0
1,029	0
1,030	0
1,031	0
1,032	0
1,033	0
1,034	0
1,035	0
1,036	0
1,037	0
1,038	0
1,039	0
1,040	0
1,041	0
1,042	0
1,043	0
1,044	0
1,045	0
1,046	0
1,047	0
1,048	0
1,049	0
1,050	0
1,051	0
1,052	0
1,053	1.8
1,054	6.4
1,055	11.7
1,056	17.1
1,057	22.4
1,058	27.4

Time (seconds)	Speed (kilometers per hour)
1,059	29.8
1,060	32.2
1,061	35.1
1,062	37.0
1,063	38.6
1,064	39.9
1,065	41.2
1,066	42.6
1,067	43.1
1,068	44.1
1,069	44.9
1,070	45.5
1,071	45.1
1,072	44.3
1,073	43.5
1,074	43.5
1,075	42.3
1,076	39.4
1,077	36.2
1,078	34.6
1,079	33.2
1,080	29.0
1,081	24.1
1,082	19.8
1,083	17.9
1,084	17.1
1,085	16.1
1,086	15.3
1,087	14.6
1,088	14.0
1,089	13.8
1,090	14.2
1,091	14.5
1,092	14.0
1,093	13.8
1,094	12.9
1,095	11.3
1,096	8.9
1,097	6.8
1,098	4.2
1,099	1.6
1,100	0.9
1,101	0.2
1,102	1.0
1,103	2.6
1,104	5.8
1,105	11.1
1,106	16.1
1,107	20.6
1,108	22.6
1,109	23.3
1,110	25.7
1,111	29.1
1,112	32.2
1,113	33.8
1,114	34.1
1,115	34.3
1,116	34.4
1,117	34.9
1,118	36.2
1,119	37.0
1,120	38.3
1,121	39.4
1,122	40.3
1,123	40.1
1,124	39.9
1,125	40.2
1,126	40.9
1,127	41.5
1,128	41.8
1,129	42.5
1,130	42.8
1,131	43.3
1,132	43.5
1,133	43.5
1,134	43.5
1,135	43.3
1,136	43.1
1,137	43.1
1,138	42.6
1,139	42.5
1,140	41.8
1,141	41.0
1,142	39.6
1,143	37.8
1,144	34.6
1,145	32.2
1,146	28.2
1,147	25.7
1,148	22.5
1,149	17.2
1,150	11.9
1,151	6.6
1,152	1.3
1,153	0
1,154	0
1,155	0
1,156	0
1,157	0
1,158	0
1,159	0
1,160	0
1,161	0
1,162	0
1,163	0
1,164	0
1,165	0
1,166	0
1,167	0
1,168	0
1,169	3.4
1,170	8.7
1,171	14.0
1,172	19.3
1,173	24.6
1,174	29.9
1,175	34.0
1,176	37.0
1,177	37.8
1,178	37.0
1,179	36.2
1,180	32.2
1,181	26.9
1,182	21.6
1,183	16.3
1,184	10.9
1,185	5.6
1,186	0.3
1,187	0
1,188	0
1,189	0
1,190	0
1,911	0
1,192	0
1,193	0.0
1,194	0.0
1,195	0.0
1,196	0.0
1,197	0.3
1,198	2.4
1,199	5.6
1,200	10.5
1,201	15.8
1,202	19.3
1,203	20.8
1,204	20.9
1,205	20.3
1,206	20.6
1,207	21.1
1,208	21.1
1,209	22.5
1,210	24.9
1,211	27.4
1,212	29.9
1,213	31.7
1,214	33.8
1,215	34.6
1,216	35.1
1,217	35.1
1,218	34.6
1,219	34.1
1,220	34.6
1,221	35.1
1,222	35.4
1,223	35.2
1,224	34.9
1,225	34.6
1,226	34.6
1,227	34.4
1,228	33.3
1,229	31.4
1,230	30.9
1,231	31.5
1,232	31.9
1,233	32.2
1,234	31.4
1,235	26.2
1,236	24.9
1,237	20.9
1,238	16.1
1,239	12.9
1,240	9.7
1,241	6.4
1,242	4.0
1,243	1.1
1,244	0
1,245	0
1,246	0
1,247	0
1,248	0
1,249	0
1,250	0
1,251	0
1,252	1.6
1,253	1.6
1,254	1.6
1,255	1.6
1,256	1.6
1,257	2.6
1,258	4.8
1,259	6.4
1,260	8.0
1,261	10.1
1,262	12.9
1,263	16.1
1,264	16.9
1,265	15.3
1,266	13.7
1,267	12.2
1,268	14.2
1,269	17.7
1,270	22.5
1,271	27.4
1,272	31.4
1,273	33.8
1,274	35.1
1,275	35.7
1,276	37.0
1,277	38.0
1,278	38.8
1,279	39.4
1,280	39.4
1,281	38.6
1,282	37.8
1,283	37.8
1,284	37.8
1,285	37.8
1,286	37.8
1,287	37.8
1,288	38.6
1,289	38.8
1,290	39.4
1,291	39.8
1,292	40.2
1,293	40.9
1,294	41.2
1,295	41.4
1,296	41.8
1,297	42.2
1,298	43.5
1,299	44.7
1,300	45.5
1,301	46.7
1,302	46.8
1,303	46.7
1,304	45.1
1,305	39.8
1,306	34.4
1,307	29.1
1,308	23.8
1,309	18.5
1,310	13.2
1,311	7.9
1,312	2.6
1,313	0
1,314	0
1,315	0
1,316	0
1,317	0
1,318	0
1,319	0
1,320	0
1,321	0
1,322	0
1,323	0
1,324	0
1,325	0
1,326	0
1,327	0
1,328	0
1,329	0
1,330	0
1,331	0
1,332	0
1,333	0
1,334	0
1,335	0
1,336	0
1,337	0
1,338	2.4
1,339	7.7
1,340	13.0
1,341	18.3
1,342	21.2
1,343	24.3
1,344	27.0
1,345	29.5
1,346	31.4
1,347	32.7
1,348	34.3
1,349	35.2
1,350	35.6
1,351	36.0
1,352	35.4
1,353	34.8
1,354	34.0
1,355	33.0
1,356	32.0
1,357	31.5
1,358	29.8
1,359	26.2
1,360	26.6
1,361	24.9
1,362	22.5
1,363	17.7
1,364	12.9
1,365	8.4
1,366	4.0
1,367	0
1,368	0
1,369	0
1,370	0
1,371	0

The diagrams below show the range of acceptable speed tolerances for typical points. The first curve is typical of portions of the speed curve which are increasing or decreasing throughout the two second time interval. The second curve is typical of portions of the speed curve which include a maximum or minimum value.





APPENDIX II

PROCEDURES FOR DYNAMOMETER ROAD POWER CALIBRATION

(a) Dynamometer Road Power Calibration for Light Duty Vehicles, Diesel Light Duty Vehicles, Light Duty Trucks, and Diesel Light Duty Trucks.

This appendix describes the method for determining the road power absorbed by a chassis dynamometer. The measured absorbed road power includes the dynamometer friction as well as the power absorbed by the power absorption unit. The dynamometer is driven above the test speed range. The device used to drive the dynamometer is then disengaged from the dynamometer and the roll(s) is allowed to coast down. The kinetic energy of the system is dissipated by the dynamometer power absorption unit and by dynamometer friction. This method neglects the variations in roll bearing friction due to the drive axle mass of the vehicle. The difference in coast down time of the free (rear) roll relative to the drive (front) roll may be neglected in the case of dynamometers with paired rolls.

These procedures shall be followed:

1. Devise a method to determine the speed of the drive roll if not already measured. A fifth wheel, revolution pickup, or other suitable means may be used.

2. Place a vehicle on the dynamometer or devise another method of driving the dynamometer.

3. Engage the inertial flywheel or another inertial simulation system for the most common vehicle mass category for which the dynamometer is used.

4. Drive the dynamometer up to 80.5 k.p.h. (50.0 m.p.h.).

5. Record indicated road power.

6. Drive the dynamometer up to 96.6 k.p.h. (60.0 m.p.h.).

7. Disengage the device used to drive the dynamometer.

8. Record the time for the dynamometer drive roll to coast down from 88.5 k.p.h. (55.0 m.p.h.) to 72.4 k.p.h. (45.0 m.p.h.).

9. Adjust the power absorption unit to a different level.

10. Repeat steps 4 to 9 above sufficient times to cover the range of road power used.

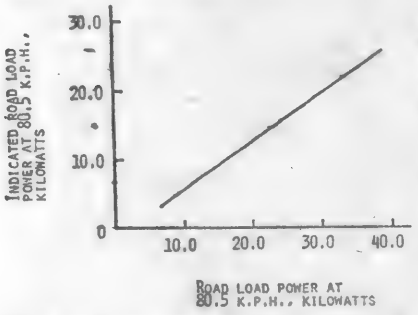
11. Calculate absorbed road power from:

$$Pd = \frac{1}{2} M1(V1^2 - V2^2)/t = 99.88\ M1/t$$

where:

Pd=Power in watts.
M1=Equivalent inertia in kg.
V1=Initial velocity in m/s (88.5 k.p.h.= 24.58 m/s).
V2=Final velocity in m/s (72.4 k.p.h.= 20.11 m/s).
t=Elapsed time for rolls to coast from 88.5 k.p.h .to 72.4 k.p.h.

12. Plot indicated road load power at 80.5 k.p.h. (50.0 m.p.h.) versus road load power at 80.5 k.p.h. (50.0 m.p.h.).



13. The road load power reported in #86.0XX–15, 86.1XX–13, 86.2XX–15, or 86.3XX–13 is obtained by entering the plot at the indicated road load power determined in #86.0XX–15(e)(2)(ii), 86.1XX–13(e)(2)(ii), 86.02XX–15(e)(2)(ii), or 86.3XX–13(e)(2)(ii).[1]

14. Once the road load power at 80.5 k.p.h. (50.0 m.p.h.) is known for a vehicle, it may be tested on other dynamometers using a similar calibration.

(b) Dynamometer Road Power Calibration for Motorcycles.

This appendix describes the method for determining the road power absorbed by a chassis dynamometer. The measured absorbed road power includes the dynamometer friction as well as the power absorbed by the power absorption unit. The dynamometer is driven above the test speed range. The device used to drive the dynamometer is then disengaged from the dynamometer and the roll(s) is allowed to coast down. The kinetic energy of the system is dissipated by the dynamometer power absorption unit and by dynamometer friction. This method neglects the variations in roll bearing friction due to the drive axle mass of the vehicle. The difference in coast down time of the free (rear) roll relative to the drive (front) roll may be neglected in the case of dynamometers with paired rolls.

These procedures shall be followed:

1. Devise a method to determine the speed of the drive roll if not already measured. A fifth wheel, revolution pickup, or other suitable means may be used.

2. Place a vehicle on the dynamometer or devise another method of driving the dynamometer.

3. Engage the inertial flywheel or another inertial simulation system for the most common vehicle mass category for which the dynamometer is used.

4. Drive the dynamometer up to 65 k.p.h. (40.4 m.p.h.).

5. Record indicated road power.

6. Drive the dynamometer up to 75 k.p.h. (46.6 m.p.h.).

7. Disengage the device used to drive the dynamometer.

8. Record the time for the dynamometer drive roll to coast down from 70 k.p.h. (43.5 m.p.h.) to 60 k.p.h. (37.3 m.p.h.).

9. Adjust the power absorption unit to a different level.

10. Repeat steps 4 to 9 above sufficient times to cover the range of road power used.

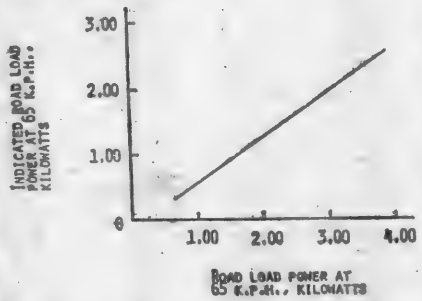
11. Calculate absorbed road power from:

$$Pd = 1/2\ M1(V1^2 - V2^2)/t = 50.01\ M1/t$$

where:

Pd=Power in watts.
M1=Equivalent inertia in kg.
V1=Initial velocity in m/s (70 k.p.h.= 19.44 m/s).
V2=Final velocity in m/s (60 k.p.h.=16.67 m/s).
t=Elapsed time for rolls to coast from 70 k.p.h. to 60 k.p.h.

12. Plot indicated road power at 65 k.p.h. (40.4 m.p.h.) versus road load power at 65 k.p.h. (40.4 m.p.h.).



13. The road load power reported in #86.4XX–15 is obtained by entering the plot at the indicated road load power determined in #86.4XX–15(e)(2)(ii).

14. Once the road load power at 65 k.p.h. (40.4 m.p.h.) is known for a vehicle, it may be tested on other dynamometers using a similar calibration.

Appendix III

Constant Volume Sampler Flow Calibration

The following calibration procedure outlines the equipment, the test setup configuration, and the various parameters which must be measured to establish the flow rate of the constant volume sampler pump. All the parameters related to the pump are simultaneously measured with the parameter related to a flowmeter which is connected in series with the pump. The calculated flow rate (m^3/rev (ft^3/rev) at pump inlet absolute pressure and temperature) can then be plotted versus a correlation function which is the value of a specific combination of pump parameters. The linear equation which relates the pump flow and the correlation function is then determined. In the event that a CVS has a multiple speed drive, a calibration for each range should be performed.

This calibration procedure is based on the measurement of the absolute values of the pump and flowmeter parameters that relate the flow rate at each point. Three conditions must be maintained to assure the accuracy and integrity of the calibration curve. First, the pump pressures should be measured at taps on the pump rather than at the external piping on the pump inlet and outlet. Pressure taps that are mounted at the top and bottom center of the pump drive headplate are exposed to the actual pump cavity pressures, and therefore reflect the absolute pressure differentials. Secondly, temperature stability must be maintained during the calibration. The laminar flowmeter is sensitive to inlet temperature oscillations which cause the data points to be scattered. Gradual changes (±1 °C (±1.8°F)) in temperature are acceptable as long as they occur over a period of several minutes. Finally, all connections between the flowmeter and the CVS pump must be absolutely void of any leakage.

During a CVS emissions test the measurement of these same pump parameters enables the user to calculate the flow rate from the calibration equation.

After the calibration curve has been obtained, a verification test of the entire system can be performed by injecting a known mass of gas into the system and comparing the mass indicated by the system to the true mass injected. An indicated error does not necessarily mean that the calibration is wrong, since other factors can influence the accuracy of the system.

Equipment: The following list of equipment will be needed to perform this calibration procedure. Figure 1 illustrates a typical equipment arrangement used for calibration. All of the equipment involved should conform to the range and accuracy as specified in Figure 1.

Equipment List: 1. LFE-Laminar Flowmeter.

2. Micromanometer.

3. Thermometer.

4. Timer.

5. U-Tube Manometers.

6. Temperature Indicator with type J Thermocouples.

7. A variable flow restrictor with appropriate piping to connect the CVS pump and LFE.

After the system has been connected as shown in Figure 1, set the variable restrictor in the wide open position and run the CVS pump for twenty minutes. Record the calibration data.

[1] Normally, the two characters after the period and subpart number are the last two digits of the model year or year of production to which the regulations apply. Since the Appendices to Part 86 apply to all model years and years of production, the characters XX have been substituted for these last two digits.

Calibration data measurements

Parameter	Symbol	Units	Tolerance
Barometric pressure (corrected)	Pb	kPa (in Hg)	±0.08 kPa (±0.0089 in Hg).
Ambient temperature	Ta	°C (°F)	±0.3° C (±0.54° F).
Air temperature into LFE	ETI	°C (°F)	±0.08° C (±0.108° F).
Pressure depression upstream of LFE	EPI	kPa (in H2O)	±0.025 kPa (±0.10 in H2O).
Pressure drop across the LFE matrix	EDP	kPa (in H2O)	±0.01 kPa (±0.004 in H2O).
Air temperature at CVS pump inlet	PTI	°C (°F)	±0.3 C (±0.54° F).
Pressure depression at CVS pump inlet	PPI	kPa (in fluid)	±0.02 kPa (±0.046 in fluid).
Specific gravity of manometer fluid (1.75 oil)	Sp. Gr		
Pressure head at CVS pump outlet	PPO	kPa (in fluid)	±0.02 kPa (±0.046 in fluid).
Air temperature at CVS pump outlet (optional)	PTO	°C (°F)	±0.3° C (±0.54° F).
Pump revolutions during test period	N	Revs	None.
Elapsed time for test period	t	Seconds	±0.05 s.

NOTE.—The fluid level in the manometer tube should stabilize before the reading is made, and the elapsed time for revolution counting should be greater than 120 s.

Reset the restrictor valve to a more restricted condition in an increment of pump inlet depression (about 1 kPa (4 in. H2O)) that will yield a minimum of six data points for the total calibration.

Allow the system to stabilize for 3 minutes and repeat the data acquisition.

Data Analysis: The data recorded during the calibration are to be used in the following calculations.

1. The air flow rate at each test point is calculated in standard cubic meters per minute (Qs) from the flowmeter data using the manufacturer's prescribed method.

2. The air flow rate is then converted to pump flow, Vo, in cubic meters per revolution at absolute pump inlet temperature and pressure.

$$Vo=(Qs/n)\ (Tp/294)\ (101.3/Pp)$$

where:

Qs=Meter air flow rate in standard cubic meters per minute (flowmeter standard conditions are 20° C (68° F), 100 kPa (29.53 in. Hg)).

n=Pump speed in revolutions per minute.

Pp=Absolute pump inlet pressure in kPa (in. Hg).

Pp=Pb−PPI.

Tp=PTI+273.

3. The correlation function at each test point is then calculated from the calibration data, as follows:

$$Xo=(1/n)\ \sqrt{[(Pe-Pp)/Pe]}$$

where:

Pe−Pp=Pressure differential from pump inlet to pump outlet in kPa (in. Hg).

Pe=Absolute pump outlet pressure in kPa (in. Hg).

Pe=Pb+PPO.

See # 85.0XX–26, 85.1XX–23, 85.2XX–26, 85.3XX–23, or 85.4XX–26 for other definitions.

4. A linear least squares fit is performed to generate the calibration equations which have the forms

$$Vo=Do-M(Xo)$$
$$n=A-B(Pe-Pp)$$

Do, M, A, and B are the slope-intercept constants describing the lines.

A CVS system that has multiple speeds should be calibrated on each speed used. The calibration curves generated for the ranges will be approximately parallel and the intercept values, Do, will increase as the pump flow range decreases.

If the calibration has been performed carefully, the calculated Vo values from the equation will be within ±0.50% of the measured value of Vo. Values of M will vary from one pump to another, but values of Do for pumps of the same make, model, and range should agree within ±3% of each other. Particulate influx from use will cause the pump slip to decrease as reflected by lower values for M. Calibrations should be performed at 0, 50, 100, 200, 400, etc. hours of pump operation to assure the stability of the pump slip rate. Analysis of mass injection data will also reflect pump slip stability.

CVS System Verification: The following technique can be used to verify that the CVS and analytical instruments can accurately measure a mass of gas that has been injected into the system.

1. Obtain a small cylinder that has been charged with pure propane or carbon monoxide gas (caution-carbon monoxide is poisonous!). Critical flow orifice devices can also be used for constant flow metering.

2. Determine a reference cylinder mass to the nearest 0.01 gram.

3. Operate the CVS in the normal manner and release a quantity of pure propane or carbon monoxide into the system during the sampling period.

4. The calculations of # 85.0XX–26, 85.1XX–23, 85.2XX–26, 85.3XX–23, or 85.XX–26 are performed in the normal way except, in the case of propane, the density of propane (0.6030 kg/m³/carbon atom (17.08 g/ft³/carbon atom)) is used in place of the density of exhaust hydrocarbons. In the case of carbon monoxide, the density of 1.149 kg/m³ (32.54 g/ft³) is used.

5. The gravimetric mass is subtracted from the CVS measured mass and then divided by the gravimetric mass to determine the percent accuracy of the system.

6. The cause for any discrepancy greater than ±2% should be found and corrected. The following list of parametric errors may assist the operator in locating the cause of large errors.

Positive Error (Indication is higher than true value):

1. Calculated Vo is greater than actual Vo.

a. Original calibration in error.

2. Pump inlet temperature recorder is reading low. A 3.33°C (6°F) discrepancy will give a 1% error.

3. Pump inlet pressure indicator is reading high. A 0.87 kPa (3.5 in. H20) high reading will give 1% error.

4. Background concentration reading is too low. Check analyzer zero. Check leakage at floor inlet.

5. Analyzer is reading high. Check span.

6. Barometer reading is in error (too high). Barometric pressure reading should be gravity and temperature corrected.

7. Revolution counter is reading high. (Check pump speed and counters.)

8. Mixture is stratified causing the sample to be higher than the average concentration in the mixture.

9. Injected gas is contaminated.

Negative Error (Indication is lower than true value):

1. Calculated Vo is less than actual Vo.

a. Original calibration in error.

b. Pump clearances decreased due to influx of some surface adherent material. Recalibration may be needed.

2. Pump inlet temperature recorder is reading high.

3. Pump inlet pressure indicator is reading low.

4. Background concentration reading is too high.

5. Analyzer is reading low.

6. Barometer reading is in error (too low).

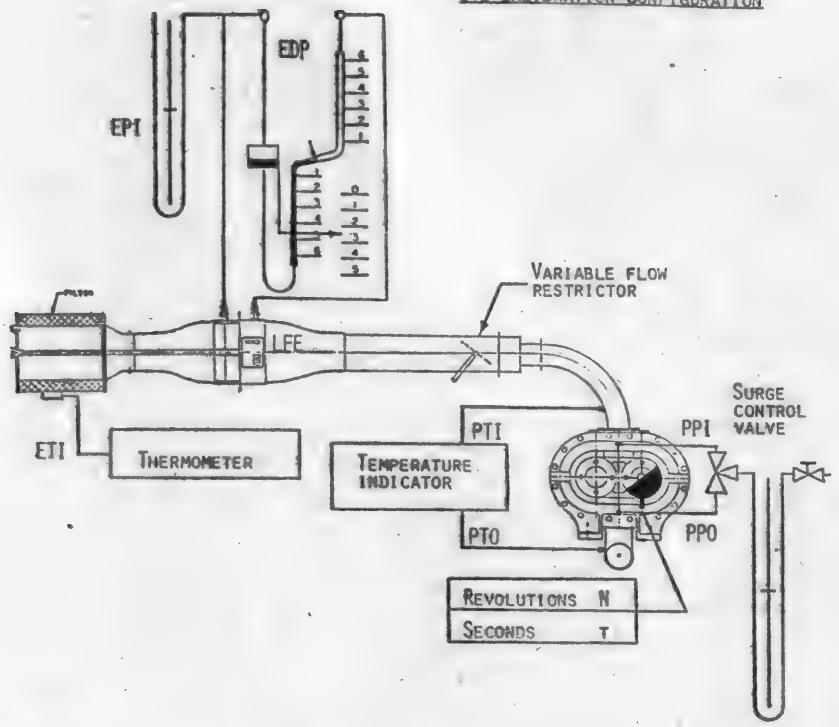
7. Revolution counter is reading low.

8. There is a leak into the sampling system. Pressure check the lines and fittings on the intake side of sample transfer pumps on both the CVS and analyzer console.

9. Injected gas is contaminated.

FIGURE 1

CVS CALIBRATION CONFIGURATION



Unit	Range	Accuracy
LFE:		
ETI	0-40° C (32-103.4° F)	±0.06° C (±0.108° F).
EPI	0-2.5 kPa (0-10.0 in H2O)	±25 Pa (±0.10 in H2O).
EDP	0-2.5 kPa (0-10.0 in H2O)	±1 Pa (±0.004 in H2O).
Pump:		
PTI	0-126° C (32-247.4° F)	±0.3° C (±0.54° F).
PPI	0-16 kPa (0-26.7 in fluid)	±20 Pa (±0.046 in fluid).
PPO	0-16 kPa (0-26.7 in fluid)	±20 Pa (±0.046 in fluid).
PTO	0-126° C (32-247.4° F)	±0.3° C (±0.54° F).
N	0-100,000	±0.
t	0-10,000 s	±0.05 s.

NOTE.—Fluid used in 16 kPa (26.7 in. fluid) manometer should extend range to at least 0-15 kPa (0-60.2 in H2O). Separate manometers for PPI and PPO may be used during calibration.

APPENDIX IV

DURABILITY DRIVING SCHEDULES

(a) Durability Driving Schedule for Light Duty Vehicles, Diesel Light Duty Vehicles, Light Duty Trucks, and Diesel Light Duty Trucks.

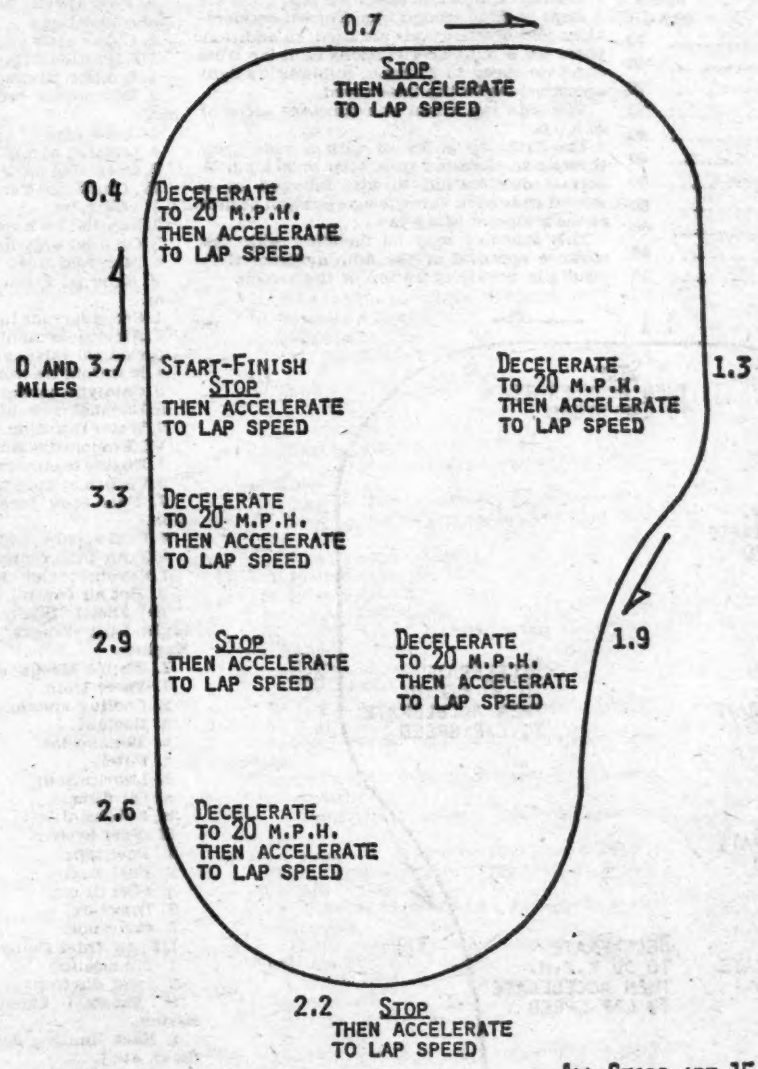
The schedule consists basically of 11 laps of a 3.7 mile course. The basic vehicle speed for each lap is listed below:

Lap	*Speed (m.p.h.)*
1	40
2	30
3	40
4	40
5	35
6	30
7	35
8	45
9	35
10	55
11	70

During each of the first nine laps there are 4 stops with 15 second idle. Normal accelerations and decelerations are used. In addition, there are 5 light decelerations each lap from the base speed to 20 m.p.h. followed by light accelerations to the base speed.

The 10th lap is run at a constant speed of 55 m.p.h.

The 11th lap is begun with a wide open throttle acceleration from stop to 70 m.p.h. A normal deceleration to idle followed by a second wide open throttle acceleration occurs at the midpoint of the lap.



ALL STOPS ARE 15 SECONDS

(b) **Durability Driving Schedule for Motorcycles with engine displacements equal to or greater than 170 cc (10.4 cu. in.).** This Durability Driving Schedule may also be used for Light Duty Vehicles, Diesel Light Duty Vehicles, Light Duty Trucks, and Diesel Light Duty Trucks.

The schedule consists basically of 11 laps of a 6.0 km (3.7 mi) course. The basic vehicle speed for each lap is listed below:

Lap	*Speed (k.p.h.)*
1	70
2	50
3	70
4	70
5	60
6	50
7	60
8	80
9	60
10	90
11	110

During each of the first nine laps there are 4 stops with 15 second idle. Normal accelerations and decelerations are used. In addition, there are 5 light decelerations each lap from the base speed to 30 k.p.h. followed by light accelerations to the base speed.

The 10th lap is run at a constant speed of 90 k.p.h.

The 11th lap is begun with a wide open throttle acceleration from stop to 110 k.p.h. A normal deceleration to idle followed by a second wide open throttle acceleration occurs at the midpoint of the lap.

This schedule may be modified with the advance approval of the Administrator if it results in unsafe operation of the vehicle.

(c) **Durability Driving Schedule for Motorcycles with engine displacements less than 170 cc (10.4 cu. in.).**

The schedule consists basically of 11 laps of a 6.0 km (3.7 mi) course. The basic vehicle speed for each lap is listed below:

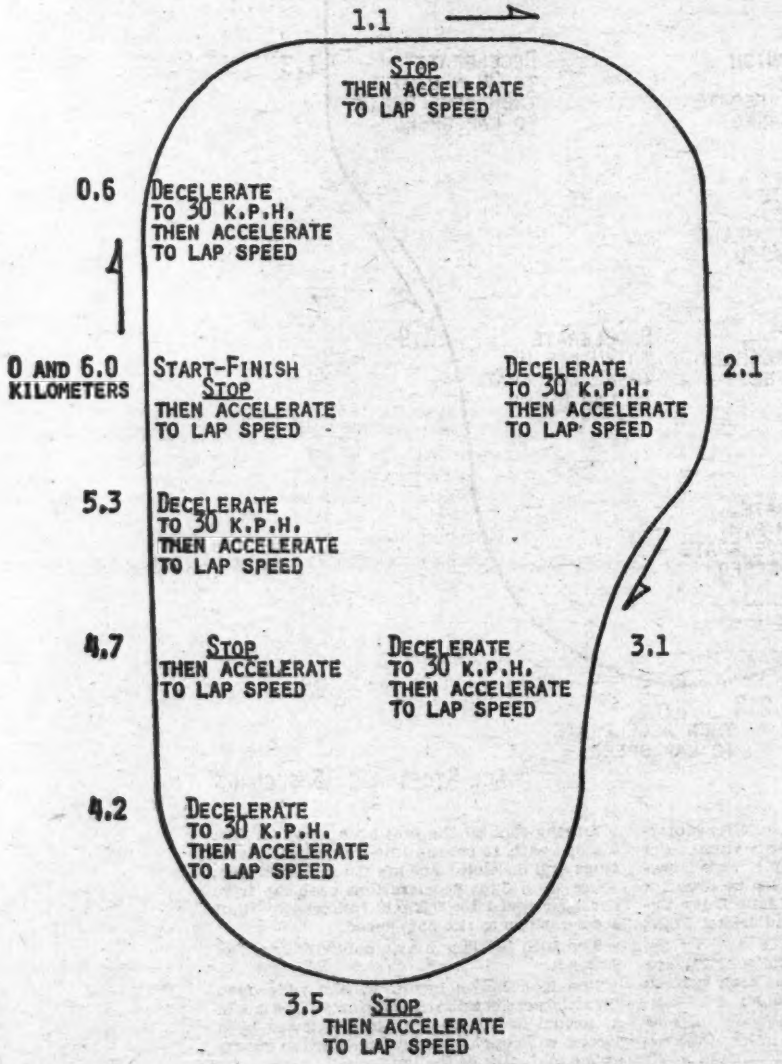
Lap:	Speed (k.p.h.)
1	70
2	50
3	70
4	70
5	60
6	50
7	60
8	80
9	60
10	90
11	90

During each of the first nine laps there are 4 stops with 15 second idle. Normal accelerations and decelerations are used. In addition, there are 5 light decelerations each lap from the base speed to 30 k.p.h. followed by light accelerations to the base speed.

The 10th lap is run at a constant speed of 90 k.p.h.

The 11th lap is begun with a wide open throttle acceleration from stop to 90 k.p.h. A normal deceleration to idle followed by a second wide open throttle acceleration occurs at the midpoint of the lap.

This schedule may be modified with the advance approval of the Administrator if it results in unsafe operation of the vehicle.



ALL STOPS ARE 15 SECONDS

APPENDIX V

(Reserved)

APPENDIX VI

VEHICLE AND ENGINE COMPONENTS

(a) Light Duty Vehicles, Light Duty Trucks, Motorcycles, and Gasoline Fueled Heavy Duty Engines.

I. Basic Mechanical Components-Engine.

1. Intake and exhaust valves.
2. Drive belts.
3. Manifold and cylinder head bolts.
4. Engine oil and filter.
5. Engine coolant.
6. Cooling system hoses and connections.
7. Vacuum fittings, hoses, and connections.
8. Oil injection metering system.

II. Fuel System.

1. Fuel specification-octane rating, lead content.
2. Carburetor-idle RPM, mixture ratio.
3. Choke mechanism.
4. Fuel system filter and fuel system lines and connections.
5. Choke plate and linkage.

III. Ignition Components.

1. Ignition timing and advance systems.
2. Distributor breaker points and condenser.
3. Spark plugs.
4. Ignition wiring.
5. Operating parts of distributor.

IV. Crankcase Ventilation System.

1. PCV valve.
2. Ventilation hoses.
3. Oil filler breather cap.
4. Manifold inlet (carburetor spacer, etc.).

V. External Exhaust Emission Control System.

1. Secondary air injection system hoses.
2. Air system manifolds.
3. Control valves and air pump.
4. Manifold reactors.
5. Catalytic converters.
6. Exhaust recirculation.
7. Water injection.

VI. Evaporative Emission Control System.

1. Engine compartment hose connections.
2. Carbon storage media.
3. Fuel tank pressure-relief valve operation.
4. Fuel vapor control valves.

VII. Air Inlet Components.

1. Carburetor air cleaner filter.
2. Hot air control valve.

(b) Diesel Light Duty Vehicles, Diesel Light Duty Trucks, and Diesel Heavy Duty Engines.

I. Engine Mechanical Components.

1. Valve train.
2. Cooling system.
a. Coolant.
b. Thermostat.
c. Filter.
3. Lubrication.
a. Oil filter.
b. Lubricant.

II. Fuel System.

1. Fuel type.
2. Fuel pump.
3. Fuel filters.
4. Injectors.
5. Governor.

III. Air Inlet Components.

1. Air cleaner.
2. Inlet ducting.

IV. External Exhaust Emission Control System.

1. Rack limiting devices (aneroid, throttle delay, etc.).
2. Manifold reactors.
3. Catalytic converters.
4. Exhaust recirculation.
5. Water injection.

APPENDIX VII

(a) Light Duty Vehicle, Diesel Light Duty Vehicle, Light Duty Truck, Diesel Light Duty Truck, and Motorcycle Parameters and Specifications.

I. Basic Engine Parameters—Four-Stroke Cycle Reciprocating Engines.

1. Cylinder bore center-to-center dimension.
2. Centerline of crankshaft to centerline of camshaft dimension.
3. Centerline of crankshaft to the top of the cyclinder block head face dimension.
4. Cylinder block configuration and material (including liners if applicable).
5. Combustion cycle.
6. Method of aspiration.
7. Displacement.
8. Bore and stroke.
9. Number of cylinders.
10. Compression ratio.
11. Surface to volume ratio.
12. Type of cylinder head and material.
13. Combustion chamber configuration.

14. Intake port area and configuration at cylinder head and manifold mating surface.
15. Exhaust port area and configuration at cylinder head and manifold mating surface.
16. Valves.
a. Head diameter.
b. Type and material.
c. Seat angle and preparation.
d. Valve spring material and load.
e. Valve spring retainer and/or rotator configuration.
f. Valve stem seal type and material.
g. Location of valves.
h. Valve activation mechanism.
i. Number of valves per cylinder.
17. Intake manifold configuration and material.
18. Exhaust manifold configuration and material.
19. Piston and piston ring(s) configuration and material.
20. Exhaust system configuration and backpressure.
21. Camshaft timing.
a. Cam profile.
b. Valve overlap.
22. Advertised power at RPM.
23. Advertised torque at RPM.
24. Governor descriptions.
25. Supercharger description.
26. Precombustion chamber configuration and material.

II. Basic Engine Parameters—Two-Stroke Cycle Reciprocating Engines.
1–25. Same as section I.
26. Intake port(s).
a. Configuration.
b. Location.
c. Preparation.
d. Timing in combustion cycle.
27. Exhaust port(s).
a. Configuration.
b. Location.
c. Preparation.
d. Timing in combustion cycle.
28. Transfer port(s).
a. Configuration.
b. Location.
c. Preparation.
d. Timing in combustion cycle.
29. Crankcase volume.
30. Precombustion chamber configuration and material.

III. Basic Engine Parameters—Rotary Engines.
1. Major axis dimension.
2. Minor axis dimension.
3. Eccentricity dimension.
4. Width of rotor housing dimension.
5. Generating radius dimension.
6. Intake port(s).
a. Configuration.
b. Location.
c. Preparation.
d. Timing and overlap if exposed to combustion chamber.
7. Exhaust port(s).
a. Configuration.
b. Location.
c. Preparation.
d. Timing and overlap if exposed to combustion chamber.
8. Housing configuration and material.
9. Combustion cycle.
10. Method of aspiration.
11. Number of spark plugs per rotor.
12. Displacement.
13. Rotor and seals.
a. Number of rotors and seals per rotor.
b. Configuration and seal retention.
c. Materials.
14. Compression ratio.
15. Surface to volume ratio.
16. Combustion chamber configuration.
17. Intake manifold configuration and material.
18. Exhaust manifold configuration and material.
19. Advertised power at RPM.
20. Advertised torque at RPM.
21. Exhaust system configuration and backpressure.
22. Governor description.
23. Supercharger description.
24. Precombustion chamber configuration and material.

IV. Air Inlet System.
1. Air cleaner type and configuration.
2. Air inlet temperature control system.
3. Inlet fresh air pick up method.
4. Maximum allowable restriction.

V. Fuel and Oil Systems.
1. Carburetion.
a. Number of carburetors.
b. Type.
c. Number of venturis per carburetor.
d. Venturi diameter.
e. Maximum air flow.
f. Fuel metering system type and calibration.
g. Enrichment system type and calibration.
h. Idle stop mechanism.
i. Starting system (e.g. choke).
j. Altitude compensation type and calibration.
k. Air-fuel flow specification (flow curve).
l. General compensation system type and calibration.
m. Component material.
n. Part number(s).
2. Fuel injection.
a. Control parameters.
b. Basic type (mechanical, electronic, timed, continuous).
c. Point of injection.
d. Maximum air flow.
e. Throttle mechanism type and calibration if applicable.
f. Fuel shutoff system type and calibration.
g. Cold start enrichment system type and calibration.
h. Enrichment system type and calibration
i. Air-fuel flow specification (flow curve).
j. Altitude compensation type and calibration.
k. General compensation systems type and calibration.
l. Injector configuration and material.
m. Operating pressures.
n. Basic injector timing and advance characteristics.
o. Part number(s).
3. General.
a. Fuel pump configuration and specifications.
b. Fuel control mechanisms and vents.
c. Altitude compensation type and calibration.
d. Idle speed specification and setting procedure.
e. Idle mixture specification and setting procedure.
f. Fuel rate at maximum power (Diesel only).
g. Fuel rate at maximum torque (Diesel only).
4. Oil injection metering system.
a. Control parameters.
b. Point of injection.
c. Fuel-oil flow specification.
d. Oil pump configuration and specifications.
e. Part number(s).

VI. Ignition System.
1. General type and description of operation.
2. Basic initial timing.
3. Spark advance specifications.
4. Spark plug.
a. Heat range.
b. Gap.
c. Tip configuration.
5. Ignition wire material.
6. Dwell (if applicable).
7. Starting circuit description.
8. General compensating systems type and calibration.
9. Altitude compensating system.
10. Insulation and heat sink (if applicable) material.
11. Part number(s).

VII. Cooling System.
1. Thermostat calibration.
2. Capacity of coolant.
3. Water pump capacity.

VIII. Engine Accessories.
1. Air conditioning system description and usage.
2. Power steering system description and usage.
3. Power brakes system description and usage.
4. Power take-off component(s) description and usage.
5. Vacuum takeoffs.

IX. Exhaust Emission Control System.
1. System type (air injection, smoke control, EGR, etc.) and method of operation.
2. Component design and materials.
3. Location of component on vehicle.
4. Calibration of components.
5. Part number(s).

X. Evaporative Emission Control System.
1. System type and method of operation.
2. Component design and materials.
3. Location of components on vehicle.
4. Calibration of components.
5. Part number(s).

XI. Crankcase Emission Control System.
1. System type and method of operation.
2. Component design and materials.
3. Location of components on vehicle.
4. Calibration of components.
5. Part number(s).

XII. Auxiliary Emission Control Devices.
1. System type and method of operation.
2. Component design and materials.
3. Location of components on vehicle.
4. Calibration of components.
5. Part number(s).

XIII. Emission Control Related Warning Systems.
1. System type and method of operation.
2. Component design and materials.
3. Location of components on vehicle.
4. Calibration of components.
5. Part number(s).

XIV. Driveline Parameters.
1. Torque convertor or clutch configuration and torque transfer performance.
2. Transmission.
a. Automatic gear ratios and shift speeds.
b. Semiautomatic and manual gear ratios.
3. Differential and transfer case.
a. Number of wheels driving vehicle.
b. Axle ratio.
c. Special features that cause any changes to the torque transfer characteristics and quantifications of the additional power requirements (eg. overdrive).
4. Tires.
a. Size.
b. Type.
5. Engine speed to vehicle speed relationship (N/V).

XV. Vehicle Parameters.
1. Model.
2. Inertial mass category.
3. Curb mass average for model.
4. Road load power requirements.
5. Engine location in vehicle.
6. Fuel tank(s) configuration and material.
7. Fuel line(s) and hose size (including restrictors) and routing.

(b) Gasoline Fueled and Diesel Heavy Duty Engine Parameters and Specifications.

I. Basic Engine Parameters—Four-Stroke Cycle Reciprocating Engines.
1. Cylinder bore center-to-center dimension.
2. Centerline of crankshaft to centerline of camshaft dimension.

3. Centerline of crankshaft to the top of the cylinder block head face dimension.
4. Cylinder block configuration and material (including liners if applicable).
5. Combustion cycle.
6. Method of aspiration.
7. Displacement.
8. Bore and stroke.
9. Number of cylinders.
10. Compression ratio.
11. Surface to volume ratio.
12. Type of cylinder head and material.
13. Combustion chamber configuration.
14. Intake port area and configuration at cylinder head and manifold mating surface.
15. Exhaust port area and configuration at cylinder head and manifold mating surface.
16. Valves.
a. Head diameter.
b. Type and material.
c. Seat angle and preparation.
d. Valve spring material and load.
e. Valve spring retainer and/or rotator configuration.
f. Valve stem seal type and material.
g. Location of valves.
h. Valve activation mechanism.
i. Number of valves per cylinder.
17. Intake manifold configuration and material.
18. Exhaust manifold configuration and material.
19. Piston and piston ring(s) configuration and material.
20. Exhaust system configuration and backpressure.
21. Camshaft timing.
a. Cam profile.
b. Valve overlap.
22. Advertised power at RPM.
23. Advertised torque at RPM.
24. Governor descriptions.
25. Supercharger description.
26. Precombustion chamber configuration and material.

II. Basic Engine Parameters—Two-Stroke Cycle Reciprocating Engines.
1–25. Same as section I.
26. Intake port(s).
a. Configuration.
b. Location.
c. Preparation.
d. Timing in combustion cycle.
27. Exhaust port(s).
a. Configuration.
b. Location.
c. Preparation.
d. Timing in combustion cycle.
28. Transfer port(s).
a. Configuration.
b. Location.
c. Preparation.
d. Timing in combustion cycle.
29. Crankcase volume.
30. Precombustion chamber configuration and material.

III. Basic Engine Parameters—Rotary Engines.
1. Major axis dimension.
2. Minor axis dimension.
3. Eccentricity dimension.
4. Width of rotor housing dimension.
5. Generating radius dimension.
6. Intake port(s).
a. Configuration.
b. Location.
c. Preparation.
d. Timing and overlap if exposed to combustion chamber.
7. Exhaust port(s).
a. Configuration.
b. Location.
c. Preparation.
d. Timing and overlap if exposed to combustion chamber.
8. Housing configuration and material.
9. Combustion cycle.
10. Method of aspiration.
11. Number of spark plugs per rotor.
12. Displacement.
13. Rotor and seals.
a. Number of rotors and seals per rotor.
b. Configuration and seal retention.
c. Materials.
14. Compression ratio.
15. Surface to volume ratio.
16. Combustion chamber configuration.
17. Intake manifold configuration and material.
18. Exhaust manifold configuration and material.
19. Advertised power at RPM.
20. Advertised torque at RPM.
21. Exhaust system configuration and backpressure.
22. Governor description.
23. Supercharger description.
24. Precombustion chamber configuration and material.

IV. Air Inlet System.
1. Air cleaner type configuration.
2. Air inlet temperature control system.
3. Inlet fresh air pick up method.
4. Maximum allowable restriction.

V. Fuel System.
1. Carburetion.
a. Number of carburetors.
b. Type.
c. Number of venturis per carburetor.
d. Venturi diameter.
e. Maximum air flow.
f. Fuel metering system type and calibration.
g. Enrichment system type and calibration.
h. Idle stop mechanism.
i. Starting system (e.g. choke).
j. Altitude compensation type and calibration.
k. Air-fuel flow specification (flow curve).
l. General compensation system type and calibration.
m. Component material.
n. Part number(s).
2. Fuel injection.
a. Control parameters.
b. Basic type (mechanical, electronic, timed, continuous).
c. Point of injection.
d. Maximum air flow.
e. Throttle mechanism type and calibration if applicable.
f. Fuel shutoff system type and calibration.
g. Cold start enrichment system type and calibration.
h. Enrichment system type and calibration.
i. Air-fuel flow specification (flow curve).
j. Altitude compensation type and calibration.
k. General compensation systems type and calibration.
l. Injector configuration and material.
m. Operating pressures.
n. Basic injector timing and advance characteristics.
o. Part number(s).
3. General.
a. Fuel pump configuration and specifications.
b. Fuel control mechanisms and vents.
c. Altitude compensation type and calibration.
d. Idle speed specification and setting procedure.
e. Idle mixture specification and setting procedure.
f. Fuel rate at maximum power (Diesel only).
g. Fuel rate at maximum torque (Diesel only).

VI. Ignition System.
1. General type and description of operation.
2. Basic initial timing.
3. Spark advance specifications.
4. Spark plug.
a. Heat range.
b. Gap.
c. Tip configuration or glow plug.
5. Ignition wire material.
6. Dwell (if applicable).
7. Starting circuit description.
8. General compensating systems type and calibration.
9. Altitude compensating system.
10. Insulation and heat sink (if applicable) material.
11. Part number(s).

VII. Cooling System.
1. Thermostat calibration.
2. Capacity of coolant.
3. Water pump capacity.

VIII. Engine Accessories.
1. Air conditioning system description and usage.
2. Power steering system description and usage.
3. Power brakes system description and usage.
4. Power take-off component(s) description and usage.
5. Vacuum take offs.

IX. Exhaust Emission Control System.
1. System type (air injection, smoke control, EGR, etc.) and method of operation.
2. Component design and materials.
3. Location of component on vehicle.
4. Calibration of components.
5. Part Number(s).

X. Evaporative Emission Control System.
1. System type and method of operation.
2. Component design and materials.
3. Location of components on vehicle.
4. Calibration of components.
5. Part number(s).

XI. Crankcase Emission Control System.
1. System type and method of operation.
2. Component design and materials.
3. Location of components on vehicle.
4. Calibration of components.
5. Part number(s).

XII. Auxiliary Emission Control Devices.
1. System type and method of operation.
2. Component design and materials.
3. Location of components on vehicle.
4. Calibration of components.
5. Part number(s).

XIII. Emission Control Related Warning Systems.
1. System type and method of operation.
2. Component design and materials.
3. Location of components on vehicle.
4. Calibrations of components.
5. Part number(s).

[FR Doc.75-28177 Filed 10-21-75;8:45 am]